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**GROUNDWATER MONITORING REPORT –
MARCH 2002
INTERMITTENT OPERATION OF THE
GROUNDWATER REMEDIATION SYSTEM**

**SPIEGELBERG SITE
LIVINGSTON COUNTY, MICHIGAN**



GROUNDWATER MONITORING REPORT – MARCH 2002

INTERMITTENT OPERATION OF THE GROUNDWATER REMEDIATION SYSTEM

**SPIEGELBERG SITE
LIVINGSTON COUNTY, MICHIGAN**

MAY 2002
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**Prepared by:
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May 14, 2002

Reference No. 3581

Mr. Ken Glatz
Remedial Project Manager
United States Environmental Protection Agency
Region V (HSRW-6J)
77 West Jackson Street
Chicago, IL 60604

COPY TO VANDERPOOL 5/17/02

Dear Mr. Glatz:

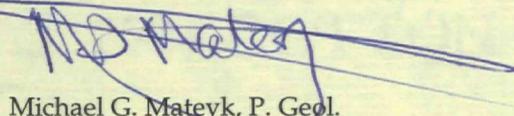
Re: March 2002 Groundwater Monitoring Report for Intermittent Operation of the
Groundwater Remediation System,
Spiegelberg Site, Livingston County, Michigan

Please find enclosed three copies of the report titled "March 2002 Groundwater Monitoring Report". Conestoga-Rovers & Associates (CRA) has prepared this report on behalf of Ford Motor Company to document the field activities and results of the eighth quarterly groundwater monitoring event completed on March 1 and 2, 2002, at the Spiegelberg Site (Site). These field activities, data evaluations and reporting were conducted in accordance with the "Protocol for Intermittent Operation of the Groundwater Remediation System" (CRA, August 1998), as approved by the United States Environmental Protection Agency (USEPA) in its letter of September 14, 1998 (Glatz to Nadeau).

The March 2002 groundwater monitoring event included hydraulic monitoring and groundwater sampling for analysis of volatile organic compounds (VOCs). As presented in Section 3.0 of this report, evaluation of the data collected during the March 2002 groundwater monitoring event indicates that groundwater flow is consistent with previous investigations and that there are no exceedances of the applicable criteria for VOCs at the Site. Based on this evaluation, no contingency evaluations or modifications to the Long-Term Monitoring Plan (LTMP) as described in the "Additional Investigation Report" (CRA, April 1999) are necessary. The next groundwater monitoring event is scheduled to occur in August 2002.

Yours truly,

CONESTOGA-ROVERS & ASSOCIATES


Michael G. Mateyk, P. Geol.

JMM/pw/117
Encl.

c.c.: Deb Larsen, Michigan Department of Environmental Quality (MDEQ), 2 copies
David Miller, Ford Motor Company
Steven C. Nadeau, Honigman Miller Schwartz and Cohn

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1.0 INTRODUCTION

In March 1998, the United States Environmental Protection Agency (USEPA), following consultation with the Michigan Department of Environmental Quality (MDEQ), approved the implementation of intermittent operation of the groundwater remediation system at the Spiegelberg Site (Site) in accordance with Section II.D of the RD/RA Scope of Work for the Site dated September 23, 1991. Thereafter, Conestoga-Rovers & Associates (CRA) developed and submitted the "Protocol for Intermittent Operation of the Groundwater Remediation System" (Protocol, CRA, August 1998). The Protocol was approved by USEPA on September 14, 1998. This submission is the eighth groundwater monitoring report of the Long-Term Monitoring Plan (LTMP) for the Site as required under the terms of the Protocol. A Site location map is presented on Figure 1.1.

1.1 SCOPE OF WORK

The following scope of work (SOW) was established under the terms of the Protocol:

1. commencement of intermittent operation of the groundwater remediation system;
2. confirmatory hydraulic monitoring;
3. additional hydrogeologic investigations, including vertical aquifer sampling (VAS) and baseline sampling;
4. installation of additional monitoring wells for the LTMP;
5. chemical and hydraulic monitoring; and
6. implementation of a contingency plan (if necessary).

Items 1 through 4, inclusive, have already been completed. Intermittent operation of the groundwater remediation system commenced on September 20, 1998. Confirmatory hydraulic monitoring was conducted in November and December 1998, and was reported in CRA's letter report to Mr. Ken Glatz, dated January 5, 1999. The additional hydrogeologic investigations were completed in February 1999 and were reported in CRA's report titled "Additional Investigation Report - Intermittent Operation of Groundwater Remediation System" (CRA, April 1999).

Installation of the additional monitoring wells for the LTMP (Item 4) and the details of the first quarterly hydraulic and chemical monitoring event (Item 5), which was

conducted during June and July 1999, were reported in the "First Quarterly Groundwater Monitoring Report" (CRA, August 1999).

The conditions pertaining to Item 6, the contingency plan, are evaluated with each monitoring event. To date, no contingency actions have been required.

2.0 SUMMARY OF FIELD ACTIVITIES

The field activities undertaken during this reporting period included hydraulic monitoring and groundwater sample collection and analysis for Target Compound List (TCL) volatile organic compounds (VOCs). The field activities at the Site, which were conducted on March 1 and March 2, 2002, consisted of hydraulic monitoring and low flow sampling, as summarized below.

2.1 HYDRAULIC MONITORING

On March 1, 2002, the static groundwater level measurements were completed at the Site. Static groundwater levels were recorded for 26 monitoring wells. Static water levels were collected from the list of hydraulic monitors presented in Table 5.4 of the Protocol and shown on Figure 2.1 of this report, with the exception of CRA-MW-7. The static groundwater level at this well was not measured due to interference believed to be caused by the dedicated pump and/or tangled tubing in the well which is obstructing access of the water level probe to the groundwater surface.

A summary of static groundwater level measurements collected from July 1999 to March 2002 is presented in Table 2.1.

2.2 GROUNDWATER SAMPLE COLLECTION AND ANALYSIS

The chemical monitoring component of the LTMP consists of semi-annual groundwater sampling for TCL VOCs analysis and annual sampling for lead and redox parameters. This semi-annual monitoring event consisted of sampling for TCL VOCs analysis only. Lead and redox parameters were sampled for during the baseline, April 2000, and August 2001 monitoring events.

Each of the monitoring wells in the chemical monitoring network (see Figure 2.2) is equipped with a dedicated bladder pump. The dedicated bladder pumps are constructed of stainless steel with a teflon bladder and are equipped with 1/4-inch diameter polyethylene tubing.

In accordance with the Protocol, groundwater samples were collected from the chemical monitoring network wells using the low-flow purging (LFP) and sampling techniques described in Appendix A of the Protocol. The final purge data are provided in Table 2.3. Groundwater samples were collected from SP-MW-60R, CRA-MW-5, SP-MW-51,

SP-MW-51A, OBG-4B, SP-MW-20D, CRA-MW-6, CRA-MW-7, and OBG-4A for analysis of the TCL VOCs listed in Appendix C of the Protocol.

The groundwater sample identification key is provided in Table 2.4. All groundwater samples collected were packed on ice in a cooler and were transported under Chain-of-Custody protocol to Severn Trent Laboratory in North Canton, Ohio.

3.0 RESULTS OF MARCH 2002 MONITORING EVENT

The purpose of the LTMP is to track any movement of residual constituents over time and to verify that natural attenuation occurs at a sufficient rate to protect potential downgradient receptors. The LTMP consists of two components: hydraulic monitoring and chemical monitoring as outlined in the Protocol. After receiving approval from the USEPA in a letter dated April 5, 2001 (Glatz to Nadeau), hydraulic monitoring and chemical monitoring for TCL VOCs are scheduled to occur on a semi-annual basis. Chemical monitoring for lead and redox parameters is scheduled to occur annually. The March 2002 event represents the eighth hydraulic monitoring and sampling for TCL VOCs analysis under the LTMP.

A contingency plan was developed as a proactive measure to be implemented in the unlikely event that residual concentrations are detected in sentry wells above the trigger concentrations. The contingency plan was presented in the Protocol and is provided in Appendix A of this report. Under the terms of the contingency plan, any exceedance at a sentry well of Michigan Part 201 Residential Cleanup Criteria (Part 201 Criteria) will trigger the evaluation of contingencies as outlined in the contingency plan provided in Appendix A. Under the terms of the contingency plan, any exceedance of the source area well criteria also will trigger the evaluation of contingency actions as outlined in Appendix A. The source area criteria are 6 µg/L for vinyl chloride and 5 µg/L for benzene.

The classification (source/sentry) of the chemical monitoring network is provided in Table 3.1.

3.1 HYDRAULIC MONITORING

The March 2002 hydraulic monitoring event consisted of the measurement of static groundwater levels in 26 Site monitoring wells on March 1, 2002. The monitoring wells that comprise the hydraulic monitoring network are shown on Figure 2.1. Static groundwater levels in all but one of the hydraulic monitors prescribed in the Protocol were measured. The static groundwater level at CRA-MW-7 was not measured due to interference caused by the dedicated pump and/or tubing in the well, which is obstructing access of the water level probe to the groundwater surface.

At the request of the EPA, monthly static Upper Aquifer groundwater level measurements for the Spiegelberg and Rasmussen sites commenced in April 2000. The most recent Upper Aquifer static groundwater level measurements were collected at the

two sites on March 1, 2002, these are presented in Table 2.2. The measured static groundwater levels were used to produce combined groundwater elevation contours for the Spiegelberg and Rasmussen Upper Aquifer, which are shown on Figure 3.1. Lower Aquifer groundwater contours for the Spiegelberg Site are presented in Table 2.1 and on Figure 3.2.

3.1.1 UPPER AQUIFER

The March 2002 groundwater elevation contours for the combined Spiegelberg and Rasmussen Upper Aquifer are presented on Figure 3.1. Figure 3.1 indicates that groundwater flow in the Spiegelberg Site Upper Aquifer is generally toward the west, and the groundwater flow in the adjacent Rasmussen site is generally towards the north and northwest. This groundwater flow pattern is consistent with the groundwater flow directions based on previous hydraulic monitoring events.

3.1.2 LOWER AQUIFER

The groundwater elevation contours for the Spiegelberg Lower Aquifer are presented on Figure 3.2. Figure 3.2 indicates that groundwater flow in the Lower Aquifer is in a north-northwest direction. This is consistent with previous groundwater elevation data obtained during previous monitoring events.

3.2 CHEMICAL MONITORING

The March 2002 chemical monitoring event consisted of the sampling of four Upper Aquifer and five Lower Aquifer monitoring wells for VOCs analysis. In accordance with the Protocol, the analytical results of sentry wells were compared to the Part 201 Criteria and the analytical results of source area wells were compared to the Site-specific contingency triggers for vinyl chloride and benzene. Classification of monitoring wells in the chemical monitoring network is summarized in Table 3.1.

All groundwater samples were analyzed for TCL VOCs by Severn Trent Laboratory in North Canton, Ohio. A copy of the laboratory report is provided in Appendix B.

The analytical data were assessed and validated by CRA's project chemist for conformance with requirements stipulated in the analytical methods and generally accepted laboratory practice. All laboratory data were reviewed for accuracy and

conformance with the analytical methods employed. Analytical data were assessed to determine whether qualifications were necessary based on holding time criteria, laboratory method blank samples, surrogate recoveries, laboratory control samples, matrix spike samples, trip blank samples, and field duplicate samples. No field blank samples were required due to the use of dedicated bladder pumps.

The laboratory data were found to exhibit acceptable levels of accuracy and precision as described in the data quality assessment and validation memorandum presented in Appendix C. No qualification was required for the laboratory data.

3.2.1 UPPER AQUIFER

The Upper Aquifer monitoring wells included in the chemical sampling event were SP-MW-60R, SP-MW-51, OBG-4A, and CRA-MW-5. All the Upper Aquifer monitoring wells are classified as source wells. The locations of these monitoring wells are presented on Figure 2.2.

The analytical results of the Upper Aquifer chemical monitoring event are presented in Table 3.2. The Part 201 Criteria for groundwater are also presented in Table 3.2. As indicated in Table 3.2, 1,1,1-TCA, 1,1-DCA, cis-1,2-DCE, chlorobenzene, and benzene were detected in the Upper Aquifer. However, vinyl chloride was not detected and the source area criteria of 5 µg/L for benzene was not exceeded. The concentrations of these VOCs in the Upper Aquifer were all below the source area criteria. Therefore, no contingency evaluations or actions are necessary.

For ease of comparison, a summary of detected VOCs in the Upper Aquifer from July 1999 to March 2002 is presented in Table 3.3. These data indicate that the VOC distributions in the Upper Aquifer during the March 2002 event are consistent with those of the previous event.

3.2.2 LOWER AQUIFER

The Lower Aquifer monitoring wells included in the chemical sampling event were OBG-4B, SP-MW-51A, SP-MW-20D, CRA-MW-6, and CRA-MW-7. Monitoring wells SP-MW-51A and OBG-4B are classified as source area monitoring wells. Monitoring wells CRA-MW-6, SP-MW-20D, and CRA-MW-7 are classified as sentry wells. The locations of these monitoring wells are shown on Figure 2.2. All Lower

Aquifer chemical monitoring network wells as designated in the Protocol were sampled for TCL VOCs during the March 2002 event.

The analytical results of the Lower Aquifer monitoring event are presented in Table 3.4, along with the applicable Part 201 Criteria.

Examination of the data for the source area monitoring wells (SP-MW-51A and OBG-4B) shows that vinyl chloride was not detected, consistent with the previous events. Very low concentrations of benzene, 1,1-DCA and cis-1,2 DCE were detected in the Lower Aquifer source wells. However, the benzene source area criteria of 5 µg/L was not exceeded and all other detected concentrations in the source area were significantly below Part 201 criteria.

With the exception of low concentrations of 1,1-DCA (31 µg/L compared to criteria of 880 µg/L) and cis-1,2 DCE (0.50 µg/L compared to criteria of 70 µg/L) at CRA-MW-7, no TCL VOCs were detected in the sentry monitoring wells. As noted, the concentrations of 1,1-DCA and cis-1,2 DCE detected at CRA-MW-7 were significantly below the Part 201 criteria. Based on these results no contingency evaluations or actions are required.

A summary of detected VOCs in the Lower from July 1999 to March 2002 is presented in Table 3.5. These data indicate that the VOC distributions in the Lower Aquifer during the March 2002 event are consistent with those obtained from the previous event.

4.0 SUMMARY

The March 2002 groundwater monitoring event of the LTMP for Intermittent Operation of the groundwater remediation system at the Spiegelberg site was conducted on March 1 and 2, 2002. The March 2002 semi-annual monitoring event included hydraulic monitoring and groundwater sample collection for analysis of TCL VOCs.

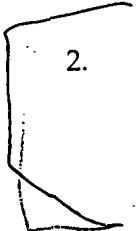
The results of the March 2002 groundwater monitoring event indicates that groundwater flow in the Spiegelberg Site Upper Aquifer is generally toward the west, and the groundwater flow in the adjacent Rasmussen site is generally towards the north and northwest. The groundwater flow in the Spiegelberg Lower Aquifer is in a north-northwest direction. These groundwater flow directions are consistent with those determined for previous events.

The results of TCL VOCs analysis from groundwater samples collected in March 2002 indicate that there are no exceedances of the vinyl chloride or benzene trigger concentrations at any source area wells in the Upper Aquifer and Lower Aquifer. The analytical data indicate that there are no exceedances of Part 201 Criteria at any of the sentry wells in the monitoring network. No contingency evaluations or actions are required based on the outcome of TCL VOCs analysis of groundwater samples collected in March 2002.

No changes to the Protocol are recommended based on the results of the March 2002 monitoring event.

During several of the past 8 hydraulic monitoring events a blockage in monitoring well CRA-MW-7 has prevented access of the water level probe to the groundwater surface. In some cases, gentle tugging of the pump lines has provided sufficient space to lower the groundwater level probe to the groundwater surface. However, during the March 2002 event it was noted that the dedicated pump equipment would not budge. This may be because the pump is sandlocked or due to tangled frost line tubing which has become wedged between the pump and well casing. In the former case, any attempts to forcefully dislodge the pump could result in loss of the pump down the well; in the latter case, it may be possible to gently untangle tubing with a narrow hooking device. In order to address this problem, CRA proposes the following:

1. During the next scheduled hydraulic monitoring event, a CRA Field Technician will attempt to determine whether the obstruction is caused by tangled tubing. If this situation is confirmed, the CRA Field Technician will attempt to untangle the tubing. If this is successful, new tubing will be installed.

- 
 2. In the event that Step 1 fails to resolve the problem, CRA will recommend that monitoring well CRA-MW-7 be withdrawn from the hydraulic monitoring program. It is CRA's opinion that CRA-MW-7 is more important for groundwater quality sampling than for hydraulic monitoring. Therefore, CRA does not advise the use of aggressive measures to dislodge the pump due to the risk of losing the pump. Lower Aquifer monitoring wells SP-MW-20D and SP-MW-53 will provide sufficient groundwater level data for hydraulic monitoring in the area.

5.0 REFERENCES

- CRA, August 1998, Protocol for Intermittent Operation of the Groundwater Remediation System, Spiegelberg Site, Livingston County, Michigan, Conestoga-Rovers & Associates, Waterloo, Ontario, Canada.
- CRA, April 1999, Additional Investigation Report - Intermittent Operation of Groundwater Remediation System, Spiegelberg Site, Livingston County, Michigan, Conestoga-Rovers & Associates, Waterloo, Ontario, Canada.
- CRA, August 1999, First Quarterly Groundwater Monitoring Report - July 1999, Intermittent Operation of the Groundwater Remediation System, Conestoga-Rovers & Associates, Waterloo, Ontario, Canada.
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- CRA, October 2001, August 2001, Groundwater Monitoring and O&M Annual Monitoring Report, Conestoga-Rovers & Associates, Waterloo, Ontario, Canada.



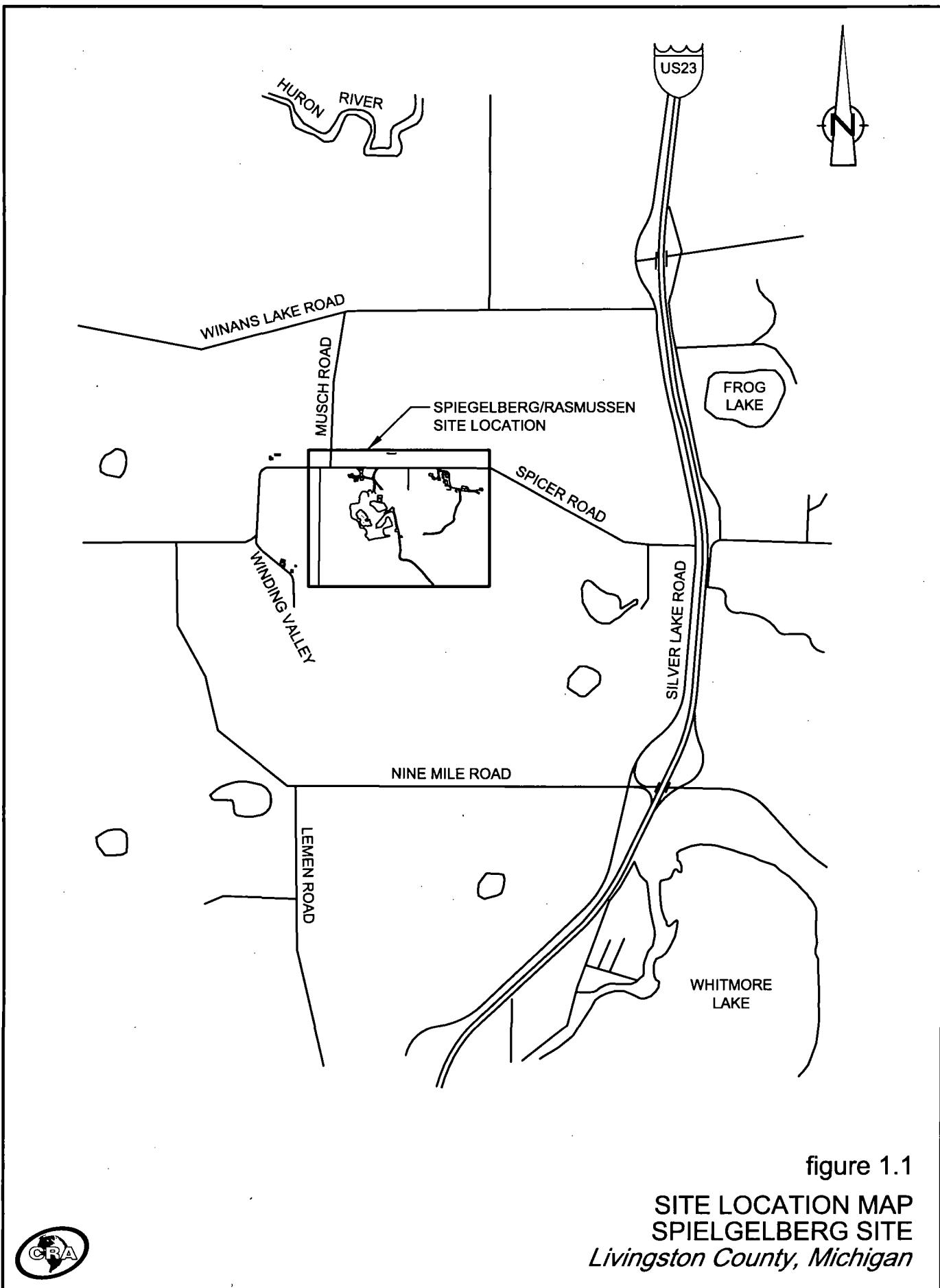
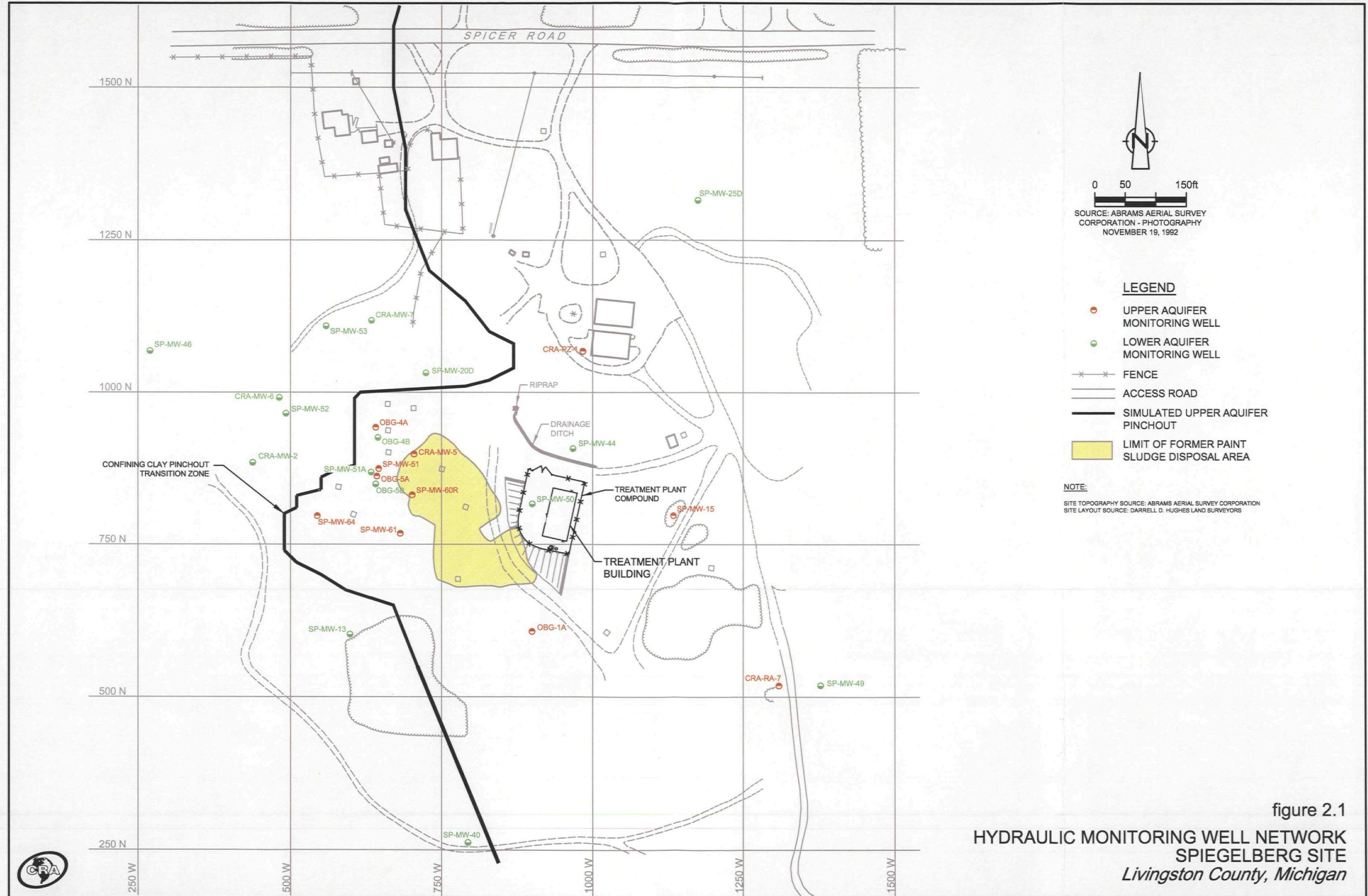
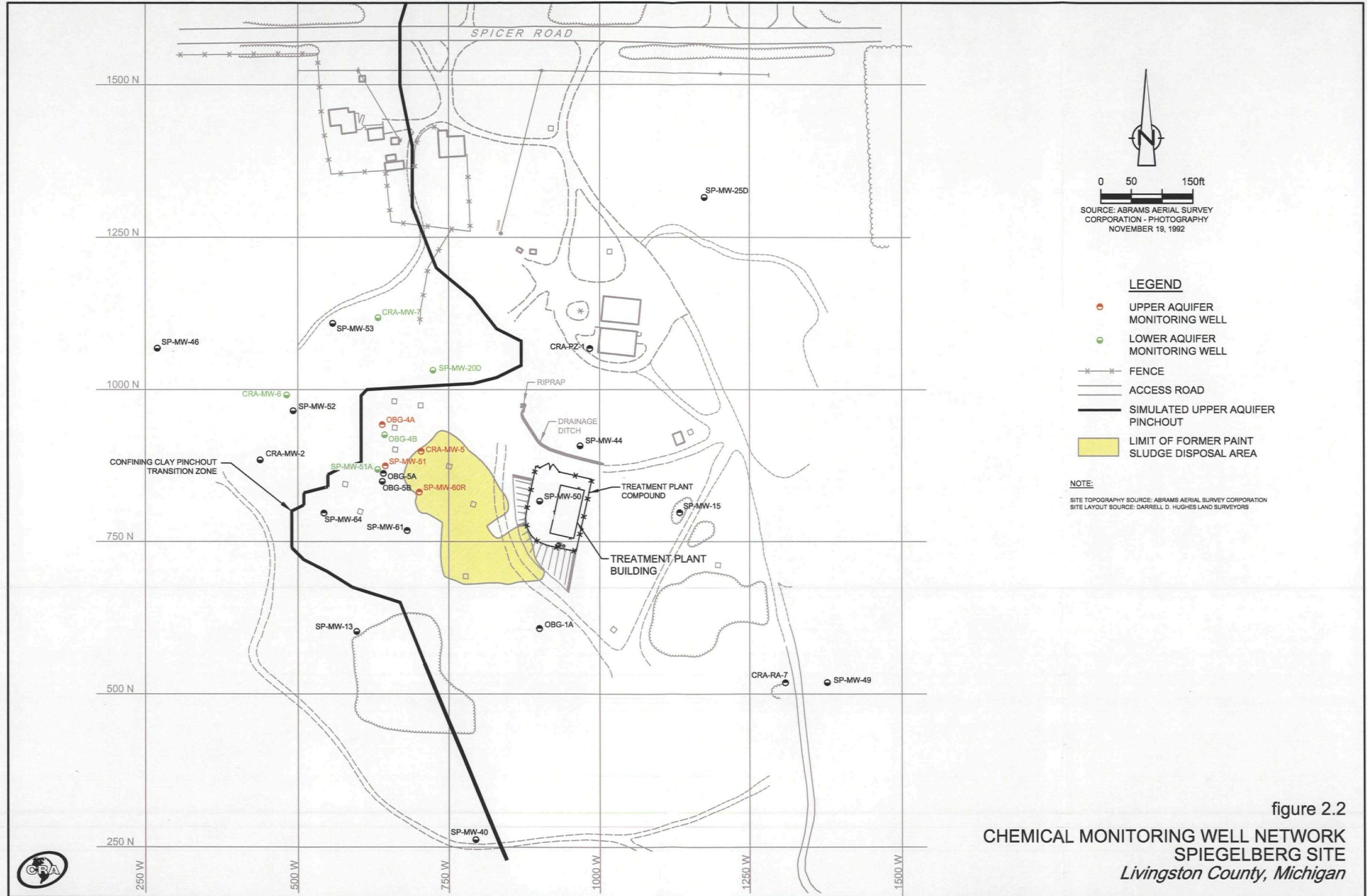
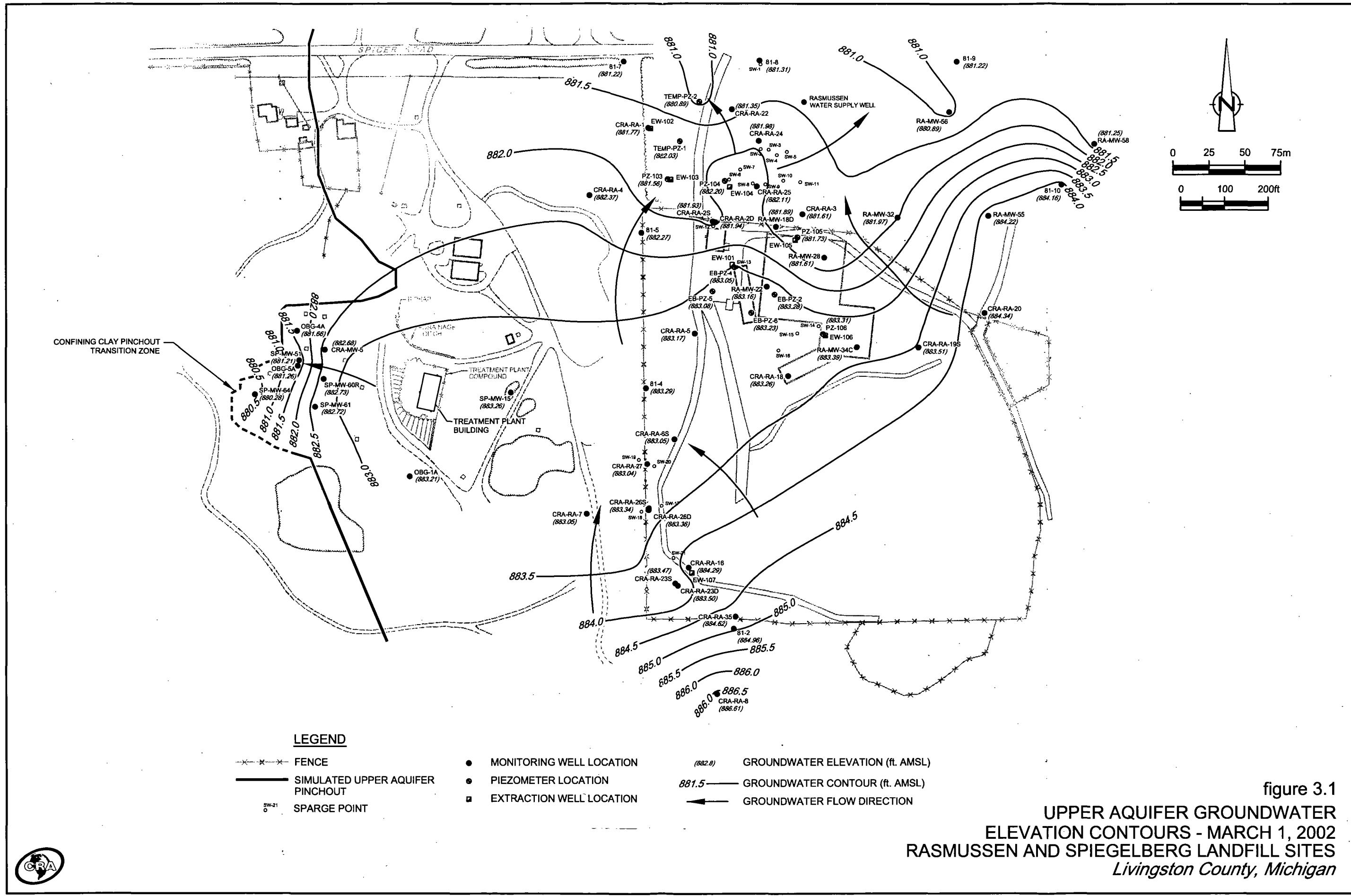


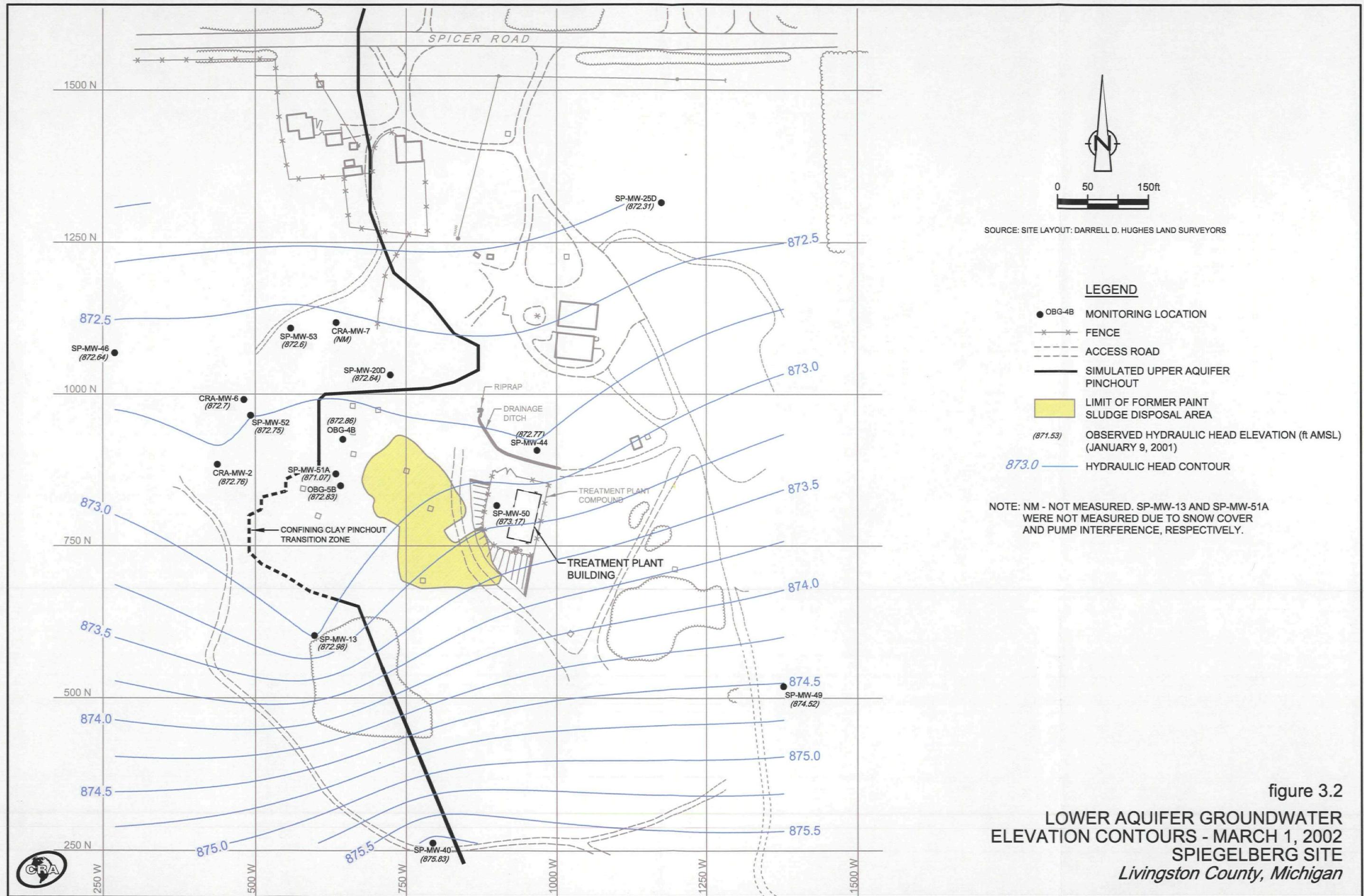
figure 1.1
SITE LOCATION MAP
SPIEGELBERG SITE
Livingston County, Michigan











TABLES

TABLE 2.1

SUMMARY OF GROUNDWATER ELEVATION DATA (JULY 1999 TO MARCH 2002)
SPIEGELBERG SITE
LIVINGSTON COUNTY, MICHIGAN

	Monitoring Well ID	Top of Riser Elevation (feet amsl)	01-Mar-02		10-Jan-01		27-Nov-00		31-Oct-00		24-Oct-00	
			Depth to Water (feet BTOR)	Water Level (feet amsl)	Depth to Water (feet BTOR)	Water Level Elevation (feet amsl)	Depth to Water (feet BTOR)	Water Level Elevation (feet amsl)	Depth to Water (feet BTOR)	Water Level Elevation (feet amsl)	Depth to Water (feet BTOR)	Water Level Elevation (feet amsl)
Upper Aquifer	CRA-RA-7	915.22	32.17	883.05	33.60	881.62	33.28	881.94	32.99	882.23	32.95	882.27
	CRA-MW-5	907.60	24.92	882.68	26.53	881.07	26.16	881.44	25.84	881.76	26.02	881.58
	CRA-PZ-1	932.95	50.1	882.85	51.64	881.31	51.32	881.63	51.10	881.85	51.14	881.81
	OBG-1A	893.16	9.95	883.21	11.75	881.41	11.11	882.05	10.90	882.26	11.11	882.05
	OBG-4A	912.69	31.03	881.66	32.86	879.83	NM	NM	NM	NM	32.05	880.64
	OBG-5A	911.25	29.99	881.26	31.94	879.31	NM	NM	31.03	880.22	31.13	880.12
	SP-MW-15	894.94	11.68	883.26	13.34	881.60	NM	NM	12.68	882.26	12.58	882.36
	SP-MW-61	897.84	15.12	882.72	16.76	881.08	16.41	881.43	15.99	881.85	16.12	881.72
	SP-MW-51	911.22	30.01	881.21	31.91	879.31	NM	NM	NM	NM	31.25	879.97
	SP-MW-60R	905.18	22.45	882.73	24.09	881.09	23.72	881.46	23.51	881.67	23.51	881.67
Lower Aquifer	SP-MW-64	922.15	41.78	880.37	43.66	878.49	43.28	878.87	42.95	879.20	42.93	879.22
	SP-MW-52	951.20	78.45	872.75	79.71	871.49	NM	NM	79.65	871.55	79.7	871.50
	SP-MW-53	940.36	67.76	872.6	69.00	871.36	NM	NM	68.96	871.40	69.01	871.35
	OBG-4B	911.03	38.17	872.86	39.47	871.56	NM	NM	39.39	871.64	39.45	871.58
	OBG-5B	911.33	38.54	872.79	39.86	871.47	39.82	871.51	39.82	871.51	39.79	871.54
	SP-MW-13	940.06	67.08	872.98	NM	NM	NM	NM	68.21	871.85	68.33	871.73
	SP-MW-20D	920.05	47.41	872.64	48.71	871.34	NM	NM	48.53	871.52	48.7	871.35
	SP-MW-25D	930.23	57.92	872.31	59.18	871.05	NM	NM	59.01	871.22	NM	NM
	SP-MW-40	918.33	42.5	875.83	43.94	874.39	NM	NM	44.00	874.33	43.86	874.47
	SP-MW-44	920.09	47.32	872.77	48.64	871.45	NM	NM	48.53	871.56	48.55	871.54
	SP-MW-46	952.60	79.96	872.64	NM	NM	NM	NM	81.03	871.57	81.24	871.36
	SP-MW-49	915.64	41.12	874.52	42.47	873.17	NM	NM	42.39	873.25	42.32	873.32
	SP-MW-50	912.10	38.93	873.17	40.25	871.85	NM	NM	40.23	871.87	40.27	871.83
	SP-MW-51A	911.06	38.23	872.83	39.99	871.07	NM	NM	59.54	851.52	39.5	871.56
	CRA-MW-2	954.48	81.72	872.76	82.95	871.53	56.00	898.48	50.52	903.96	82.89	871.59
	CRA-MW-6	952.73	80.03	872.7	81.31	871.42	NM	NM	81.30	871.43	81.31	871.42
	CRA-MW-7	939.98	NM	NM	NM	NM	NM	NM	68.66	871.32	68.65	871.33

Note:

NM - Not measured

TABLE 2.1

SUMMARY OF GROUNDWATER ELEVATION DATA (JULY 1999 TO MARCH 2002)
SPIEGELBERG SITE
LIVINGSTON COUNTY, MICHIGAN

Monitoring Well ID	Top of Riser Elevation (feet amsl)	29-Sep-00		30-Aug-00		30-Jun-00		30-May-00		27-Apr-00		
		Depth to Water (feet BTOR)	Water Level (feet amsl)	Depth to Water (feet BTOR)	Water Level (feet amsl)	Depth to Water (feet BTOR)	Water Level (feet amsl)	Depth to Water (feet BTOR)	Water Level (feet amsl)	Depth to Water (feet BTOR)	Water Level (feet amsl)	
<i>Upper Aquifer</i>	CRA-RA-7	915.22	32.94	882.28	32.95	882.27	33.66	881.56	34.30	880.92	34.52	880.70
	CRA-MW-5	907.60	25.81	881.79	25.80	881.80	26.30	881.30	27.02	880.58	27.20	880.40
	CRA-PZ-1	932.95	51.00	881.95	51.00	881.95	61.74	871.21	52.29	880.66	52.44	880.51
	OBG-1A	893.16	10.98	882.18	10.92	882.24	11.02	882.14	11.71	881.45	12.64	880.52
	OBG-4A	912.69	NM	NM	32.03	880.66	NM	NM	NM	NM	33.77	878.92
	OBG-5A	911.25	31.01	880.24	31.03	880.22	32.04	879.21	32.78	878.47	33.03	878.22
	SP-MW-15	894.94	12.66	882.28	12.62	882.32	13.06	881.88	13.75	881.19	13.81	881.13
	SP-MW-61	897.84	16.02	881.82	16.02	881.82	16.55	881.29	17.23	880.61	17.41	880.43
	SP-MW-51	911.22	NM	NM	31.00	880.22	NM	NM	NM	NM	32.96	878.26
	SP-MW-60R	905.18	23.35	881.83	23.38	881.80	23.90	881.28	24.56	880.62	24.98	880.20
<i>Lower Aquifer</i>	SP-MW-64	922.15	42.84	879.31	42.91	879.24	44.02	878.13	44.61	877.54	44.80	877.35
	SP-MW-52	951.20	79.70	871.50	79.85	871.35	80.04	871.16	80.38	870.82	82.14	869.06
	SP-MW-53	940.36	69.06	871.30	69.15	871.21	69.31	871.05	69.65	870.71	69.39	870.97
	OBG-4B	911.03	39.55	871.48	39.60	871.43	39.80	871.23	40.06	870.97	39.90	871.13
	OBG-5B	911.33	39.87	871.46	39.90	871.43	40.13	871.20	40.45	870.88	40.20	871.13
	SP-MW-13	940.06	68.43	871.63	68.45	871.61	68.69	871.37	68.96	871.10	68.70	871.36
	SP-MW-20D	920.05	48.73	871.32	48.80	871.25	48.95	871.10	49.28	870.77	49.09	870.96
	SP-MW-25D	930.23	59.15	871.08	59.35	870.88	59.45	870.78	59.73	870.50	59.55	870.68
	SP-MW-40	918.33	43.96	874.37	44.00	874.33	44.45	873.88	44.72	873.61	44.70	873.63
	SP-MW-44	920.09	48.66	871.43	NM	NM	48.95	871.14	49.25	870.84	49.99	870.10
	SP-MW-46	952.60	81.26	871.34	81.30	871.30	81.52	871.08	81.79	870.81	81.05	871.55
	SP-MW-49	915.64	42.43	873.21	42.44	873.20	42.72	872.92	43.04	872.60	42.90	872.74
	SP-MW-50	912.10	40.30	871.80	40.35	871.75	40.55	871.55	40.82	871.28	40.50	871.60
	SP-MW-51A	911.06	NM	NM	40.09	870.97	39.85	871.21	40.19	870.87	39.90	871.16
	CRA-MW-2	954.48	83.05	871.43	83.11	871.37	83.30	871.18	83.64	870.84	83.37	871.11
	CRA-MW-6	952.73	81.34	871.39	81.44	871.29	81.60	871.13	81.93	870.80	81.65	871.08
	CRA-MW-7	939.98	NM	NM	NM	NM	NM	NM	69.27	870.71	68.99	870.99

Note:

NM - Not measured

TABLE 2.1

SUMMARY OF GROUNDWATER ELEVATION DATA (JULY 1999 TO MARCH 2002)
SPIEGELBERG SITE
LIVINGSTON COUNTY, MICHIGAN

Monitoring Well ID	Top of Riser Elevation (feet amsl)	10-Apr-00		10-Jan-00		11-Oct-99		17-Jul-99	
		Depth to Water (feet BTOR)	Water Elevation (feet amsl)						
<i>Upper Aquifer</i>	CRA-RA-7	915.22	34.47	880.75	32.54	882.68	33.51	881.71	32.54
	CRA-MW-5	907.60	27.47	880.13	25.40	882.20	26.25	881.35	25.40
	CRA-PZ-1	932.95	52.60	880.35	50.55	882.40	51.41	881.54	50.55
	OBG-1A	893.16	12.73	880.43	10.55	882.61	11.56	881.60	10.55
	OBG-4A	912.69	33.72	878.97	31.49	881.20	NM	NM	31.49
	OBG-5A	911.25	33.20	878.05	30.45	880.80	NM	NM	30.45
	SP-MW-15	894.94	14.24	880.70	12.18	882.76	13.08	881.86	12.18
	SP-MW-61	897.84	17.71	880.13	15.64	882.20	16.52	881.32	15.64
	SP-MW-51	911.22	32.91	878.31	30.51	880.71	31.50	879.72	30.51
	SP-MW-60R	905.18	25.03	880.15	22.94	882.24	23.79	881.39	22.94
<i>Lower Aquifer</i>	SP-MW-64	922.15	44.38	877.77	NM	NM	43.33	878.82	NM
	SP-MW-52	951.20	82.11	869.09	79.83	871.37	80.11	871.09	78.50
	SP-MW-53	940.36	69.35	871.01	69.10	871.26	68.56	871.80	67.80
	OBG-4B	911.03	39.85	871.18	39.52	871.51	38.89	872.14	38.29
	OBG-5B	911.33	40.15	871.18	39.80	871.53	39.34	871.99	38.70
	SP-MW-13	940.06	68.72	871.34	NM	NM	67.96	872.10	67.15
	SP-MW-20D	920.05	49.00	871.05	48.72	871.33	48.20	871.85	47.54
	SP-MW-25D	930.23	59.52	870.71	59.10	871.13	58.76	871.47	58.03
	SP-MW-40	918.33	44.55	873.78	44.10	874.23	43.53	874.80	42.75
	SP-MW-44	920.09	49.00	871.09	48.61	871.48	48.12	871.97	47.41
	SP-MW-46	952.60	81.09	871.51	81.01	871.59	80.73	871.87	80.09
	SP-MW-49	915.64	42.92	872.72	43.00	NM	42.04	873.60	NM
	SP-MW-50	912.10	40.48	871.62	40.28	871.82	39.76	872.34	39.83
	SP-MW-51A	911.06	31.81	879.25	NM	NM	39.10	871.96	38.32
	CRA-MW-2	954.48	83.32	871.16	82.98	871.50	82.42	872.06	81.75
	CRA-MW-6	952.73	81.62	871.11	81.35	871.38	80.81	871.92	81.20
	CRA-MW-7	939.98	68.98	871.00	68.73	871.25	68.16	871.82	67.45

Note:

NM - Not measured

TABLE 2.2

SUMMARY OF GROUNDWATER ELEVATION DATA - UPPER AQUIFER (MARCH 2002)
SPIEGELBERG AND RASMUSSEN SITES
LIVINGSTON COUNTY, MICHIGAN

<i>Upper Aquifer MW</i>	<i>Top of Riser Elevation</i>	<i>1-Mar-02 Depth to Water</i>	<i>1-Mar-02 Water Level Elevation</i>
81-10	915.88	31.72	884.16
81-2	905.72	20.76	884.96
81-4	912.44	29.15	883.29
81-5	915.77	33.5	882.27
81-7	926.99	45.77	881.22
81-8	924.08	42.77	881.31
81-9	896.6	15.38	881.22
CRA-MW-2	954.48	81.72	872.76
CRA-MW-5	907.6	24.92	882.68
CRA-PZ-1	932.95	50.1	882.85
CRA-RA-16	941.94	57.65	884.29
CRA-RA-18	924.14	40.88	883.26
CRA-RA-19S	930.29	46.78	883.51
CRA-RA-20	942.15	57.81	884.34
CRA-RA-22	934.51	53.16	881.35
CRA-RA-23D	915.75	32.25	883.5
CRA-RA-23S	915.98	32.51	883.47
CRA-RA-24	937.94	55.96	881.98
CRA-RA-25	935.48	53.37	882.11
CRA-RA-26D	932.511	49.151	883.36
CRA-RA-26S	932.399	49.059	883.34
CRA-RA-2D	937.14	55.2	881.94
CRA-RA-2S	936.83	54.9	881.93
CRA-RA-3	933.95	52.34	881.61
CRA-RA-35	907.87	23.25	884.62
CRA-RA-5	937.24	54.07	883.17
CRA-RA-6S (OLD)	941.6	58.55	883.05
CRA-RA-7	915.22	32.17	883.05
CRA-RA-8	903.88	17.27	886.61
EB-PZ-2	922.76	39.48	883.28
EB-PZ-5	937.45	54.37	883.08
EB-PZ-6	937.33	54.1	883.23
OBG-1A	893.16	9.95	883.21
OBG-5B	911.33	38.54	872.79
PZ-103	937.86	56.3	881.56
PZ-105	932.68	50.95	881.73
PZ-106	921.82	38.51	883.31
RA-MW-18D	937.37	55.48	881.89
RA-MW-22	924.62	41.46	883.16

TABLE 2.2

SUMMARY OF GROUNDWATER ELEVATION DATA - UPPER AQUIFER (MARCH 2002)
SPIEGELBERG AND RASMUSSEN SITES
LIVINGSTON COUNTY, MICHIGAN

<i>Upper Aquifer MW</i>	<i>Top of Riser Elevation</i>	<i>1-Mar-02 Depth to Water</i>	<i>1-Mar-02 Water Level Elevation</i>
RA-MW-28	923.38	41.77	881.61
RA-MW-32	916.15	34.18	881.97
RA-MW-34C	924.39	41	883.39
RA-MW-55	920.25	36.03	884.22
RA-MW-56	915.06	34.17	880.89
RA-MW-58	901.98	20.73	881.25
SP-MW-60R	905.18	22.45	882.73
SP-MW-61	897.84	15.12	882.72
SP-MW-64	922.15	41.87	880.28
TEMP-PZ-1	937.69	55.66	882.03
TEMP-PZ-2	933.29	52.4	880.89

TABLE 2.3

SUMMARY OF WELL PURGE DATA (MARCH 2002)
SPIEGELBERG SITE
LIVINGSTON COUNTY, MICHIGAN

<i>Upper Aquifer</i>		<i>pH</i>	<i>temperature</i> (degrees C)	<i>Conductivity</i> ($\mu\text{S}/\text{cm}$)	<i>ORP</i> (mV)	<i>DO</i> (mg/L)	<i>Turbidity</i> (NTU)	<i>Aesthetics</i>
<i>MW</i>								
CRA-MW-5	7.1800	9.8100	0.7760	-2.0000	1.3800	3.0000	no comment	
OBG-4A	7.6000	9.4400	0.3780	72.0000	8.7300	4.3000	no comment	
SP-MW-60R	7.4600	6.9000	0.5260	-81.0000	0.5900	1.8900	no comment	
SP-MW-51	7.3000	9.3400	0.7200	-21.0000	2.0500	4.9000	no comment	
<i>Lower Aquifer</i>		<i>pH</i>	<i>temperature</i> (degrees C)	<i>Conductivity</i> ($\mu\text{S}/\text{cm}$)	<i>ORP</i> (mV)	<i>DO</i> (mg/L)	<i>Turbidity</i> (NTU)	<i>Aesthetics</i>
<i>MW</i>								
OBG-4B	7.1800	6.7400	0.7790	55.0000	3.5300	4.7000	no comment	
SP-MW-20D	7.7100	7.4800	0.5560	-46.0000	2.0000	4.3000	no comment	
SP-MW-51A	7.4500	8.6100	0.7400	-4.0000	1.1800	4.6100	no comment	
CRA-MW-6	7.9200	6.8500	0.5730	41.0000	7.8900	4.3000	no comment	
CRA-MW-7	7.4000	5.1100	0.6780	-28.0000	1.6000	4.6000	no comment	

TABLE 2.4

GROUNDWATER SAMPLE IDENTIFICATION KEY (MARCH 2002)
SPIEGELBERG SITE
LIVINGSTON COUNTY, MICHIGAN

<i>Well Identification</i>	<i>Sample Identification Number</i>	<i>QA/QC</i>	<i>Parameters</i>
SP-MW-60R	GW-3581-030102-BW-67		TAL VOCs
CRA-MW-5	GW-3581-030102-BW-68		TAL VOCs
SP-MW-51A	GW-3581-030102-BW-69		TAL VOCs
SP-MW-51	GW-3581-030102-BW-70		TAL VOCs
SP-MW-51 (DUP)	GW-3581-030102-BW-71	duplicate	TAL VOCs
OBG-4A	GW-3581-030102-BW-72		TAL VOCs
OBG-4B	GW-3581-030102-BW-73		TAL VOCs
SP-MW-20D	GW-3581-030102-BW-74	MS/MSD	TAL VOCs
CRA-MW-6	GW-3581-030102-BW-75		TAL VOCs
CRA-MW-7	GW-3581-030102-BW-76		TAL VOCs

TABLE 3.1**CHEMICAL MONITORING NETWORK WELL CLASSIFICATION
SPIEGELBERG SITE
LIVINGSTON COUNTY, MICHIGAN**

<i>Aquifer</i>	<i>Monitoring Well</i>	<i>Purpose</i>
Upper	SP-MW-51	Source Area Well
	SP-MW-60R	Source Area Well
	CRA-MW-5	Source Area Well
	OBG-4A	Source Area Well
Lower	SP-MW-51A	Source Area Well
	OBG-4B	Source Area Well
	SP-MW-20D	Sentry Well
	CRA-MW-6	Sentry Well
	CRA-MW-7	Sentry Well

TABLE 3.2

**SUMMARY OF ANALYTICAL RESULTS
UPPER AQUIFER (MARCH 2002)
SPIEGELBERG SITE
LIVINGSTON COUNTY, MICHIGAN**

<i>Sample Location:</i>		<i>CRA-MW-5</i> <i>GW-3581-030102-BW-068</i> <i>3/1/2002</i>	<i>OBC-4A</i> <i>GW-3581-030102-BW-072</i> <i>3/1/2002</i>	<i>SP-MW-51</i> <i>GW-3581-030102-BW-070</i> <i>3/1/2002</i>	<i>SP-MW-51</i> <i>GW-3581-030102-BW-071</i> <i>3/1/2002</i> <i>Duplicate</i>	<i>SP-MW-60R</i> <i>GW-3581-030102-BW-067</i> <i>3/1/2002</i>
<i>Sample ID:</i>						
<i>Sample Date:</i>						
<i>Parameter</i>	<i>Unit</i>					
<i>General Chemistry</i>						
Conductivity	μmhos/cm	-	0.776	0.378	0.72	0.526
Dissolved Oxygen	mg/L	-	1.38	8.73	-	0.8590
Oxidation reduction potential	millivolts	-	-2	72	-21	-81
pH (water)	s.u.	-	7.18	7.6	7.3	7.46
Temperature	deg C	-	9.81	9.44	9.34	6.9
Turbidity	ntu	-	3	4.3	4.9	1.89
<i>Volatiles</i>						
1,1,1-Trichloroethane	μg/L	200	ND (1.0)	7.7	ND (1.0)	ND (1.0)
1,1,2,2-Tetrachloroethane	μg/L	8.5	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,1,2-Trichloroethane	μg/L	5	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,1-Dichloroethane	μg/L	880	1.6	ND (1.0)	1.1	1.2
1,1-Dichloroethene	μg/L	7	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,2-Dichloroethane	μg/L	5	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,2-Dichloropropane	μg/L	5	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
2-Butanone	μg/L	13000	ND (10)	ND (10)	ND (10)	ND (10)
2-Hexanone	μg/L	1000	ND (10)	ND (10)	ND (10)	ND (10)
4-Methyl-2-pentanone	μg/L	1800	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Acetone	μg/L	730	ND (10)	ND (10)	ND (10)	ND (10)
Benzene	μg/L	5	4.4	ND (1.0)	ND (1.0)	ND (1.0)
Bromodichloromethane	μg/L	100	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Bromoform	μg/L	100	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Bromomethane	μg/L	10	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Carbon disulfide	μg/L	800	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Carbon tetrachloride	μg/L	5	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Chlorobenzene	μg/L	100	4.6	ND (1.0)	ND (1.0)	ND (1.0)
Chloroethane	μg/L	430	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
Chloroform (Trichloromethane)	μg/L	100	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Chloromethane	μg/L	260	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
cis-1,2-Dichloroethene	μg/L	70	ND (0.50)	ND (0.50)	ND (0.50)	0.80
cis-1,3-Dichloropropene	μg/L	21	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Dibromochloromethane	μg/L	100	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Ethylbenzene	μg/L	74	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Methylene chloride	μg/L	5	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Styrene	μg/L	100	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Tetrachloroethene	μg/L	5	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Toluene	μg/L	790	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
trans-1,2-Dichloroethene	μg/L	100	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
trans-1,3-Dichloropropene	μg/L	21	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Trichloroethene	μg/L	5	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Vinyl chloride	μg/L	2	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Xylene (total)	μg/L	280	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)

Notes:

ND - Non-detect at associated value.

-- - Not applicable.

TABLE 3.3

Page 1 of 2

**SUMMARY OF DETECTED COMPOUNDS
UPPER AQUIFER (JULY 1999 TO MARCH 2002)
SPIEGELBERG SITE
LIVINGSTON COUNTY, MICHIGAN**

Sample Location:	CRA-MW-5 3/1/02	CRA-MW-5 8/24/01	CRA-MW-5 1/10/01	CRA-MW-5 10/24/00	CRA-MW-5 4/12/00	CRA-MW-5 4/12/00 <i>Duplicate</i>	CRA-MW-5 1/18/00	CRA-MW-5 1/18/00 <i>Duplicate</i>	CRA-MW-5 10/14/99	CRA-MW-5 7/7/99	OBG-4A 3/1/02	OBG-4A 8/24/01	OBG-4A 1/11/01	OBG-4A 10/25/00	OBG-4A 10/14/99	OBG-4A 7/8/99
Parameter																
General Chemistry																
Conductivity																
Conductivity	µhos/cm	-	0.776	0.8540	0.852	0.757	4.37	-	0.454	-	0.377	0.412	0.378	0.3990	0.595	0.569
Dissolved Oxygen	mg/L	-	1.38	6.9300	0.72	2.33	1.79	-	1.92	-	0.61	0.85	8.73	8.5100	2.16	2.35
Nitrate (Dissolved)	mg/L	-	ND (0.10)	-	-	0.16	0.14	-	-	-	-	-	0.62	-	-	-
Oxidation reduction potential	millivolts	-	-2	-44.1000	-57	207	-65.9	-	-64.9	-	-106.2	-81.9	72	69.9000	-19	320
pH (water)	s.u.	-	7.18	-	-	-	-	-	-	-	-	-	7.6	-	-	-
pH Field	s.u.	-	-	6.6100	7.17	6.93	7.1	-	6.68	-	7.22	7.03	-	7.0200	7.57	7.19
Sulfate (Filtered)	mg/L	-	-	67.5	-	-	36.2	36.2	-	-	-	-	-	9.8	-	-
Temperature	deg c	-	9.81	15.2000	8.69	16.26	11.61	-	11.13	-	11.52	12.64	9.44	14.7800	10.47	13.8
Turbidity	ntu	-	3	2.0000	3	4	5	-	5	-	1.5	2.2	4.3	5.0000	3	8
Metals																
Iron (Dissolved Field)	mg/L	-	-	-	-	-	0.6	-	-	-	-	-	-	-	-	-
Iron (Dissolved Lab)	mg/L	-	-	5.8	-	-	2.4	2.7	-	-	-	-	-	ND (0.10)	-	-
Lead	mg/L	-	-	ND (0.0030)	-	-	ND (0.0030)	ND (0.0030)	-	-	-	-	-	ND (0.0030)	-	-
Volatiles																
1,1,1-Trichloroethane	µg/L	200	ND (1.0)	ND (1.0)	1.3	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	7.7	20	8.9	15
1,1-Dichloroethane	µg/L	880	1.6	1.9	1.2	ND (1.0)	1.2	1.4	ND (1.0)	ND (1.0)	ND (1.0)	0.25 J	ND (1.0)	1.5	3.3	1.0
1,1-Dichloroethylene	µg/L	7.0	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	1.1	1.2
Benzene	µg/L	5.0	4.4	2.5	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Carbon disulfide	µg/L	800	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Chlorobenzene	µg/L	100	4.6	3.6	1.3	1.8	1.8	1.5	1.7	1.8	1.6	1.5	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Chloroethane	µg/L	430	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	0.31 J	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
cis-1,2-Dichloroethene	µg/L	70	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Methane	µg/L	-	-	150	-	-	430	370	-	-	-	-	-	ND (0.50)	-	-
Tetrachloroethene	µg/L	5.0	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	0.15 J
Toluene	µg/L	790	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
trans-1,2-Dichloroethene	µg/L	100	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Vinyl chloride	µg/L	2.0	ND (1.0)	ND (2.0)	2.7	2.0	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)

Notes:

J - Estimated.

ND - Non-detect at associated value.

U - Non-detect at associated value.

-- - Not applicable.

TABLE 3.3

**SUMMARY OF DETECTED COMPOUNDS
UPPER AQUIFER (JULY 1999 TO MARCH 2002)
SPIEGELBERG SITE
LIVINGSTON COUNTY, MICHIGAN**

<i>Sample Location:</i>		SP-MW-51 3/1/02	SP-MW-51 3/1/02	SP-MW-51 8/24/01	SP-MW-51 1/10/01	SP-MW-51 10/25/00	SP-MW-51 10/14/99	OBG-5A 7/8/99	SP-MW-60R 3/1/02	SP-MW-60R 8/24/01	SP-MW-60R 1/10/01	SP-MW-60R 10/24/00	SP-MW-60R 4/11/00	SP-MW-60R 1/18/00	SP-MW-60R 10/13/99	SP-MW-60R 7/7/99	
<i>Sample Date:</i>																	
<i>Parameter</i>																	
		<i>Part 201</i>															
		<i>Criteria</i>															
General Chemistry																	
Conductivity	µmhos/cm	-	0.72	-	0.5810	0.689	-	0.546	0.543	0.526	0.4630	0.466	0.469	2.9	0.409	0.451	0.576
Dissolved Oxygen	mg/L	-	2.05	-	8.3100	1.28	-	1.13	0.98	0.8590	8.0400	0.45	0.54	1.42	2	0.73	0.92
Nitrate (Dissolved)	mg/L	-	-	-	ND (0.10)	-	-	-	-	-	ND (0.10)	-	-	ND (0.10)	-	-	-
Oxidation reduction potential	millivolts	-	-21	-	-128.0000	-126	-	-125.2	-139.1	-81	-188.8000	-125	-183	-85.2	-70.3	-95.8	-45.7
pH (water)	s.u.	-	7.3	-	-	-	-	-	-	7.46	-	-	-	-	-	-	-
pH Field	s.u.	-	-	-	6.9100	7.57	-	7.22	7.11	-	6.8500	7.35	7.06	7.15	6.68	6.99	6.96
Sulfate (Filtered)	mg/L	-	-	-	20.9	-	-	-	-	-	21.3	-	-	19.4	-	-	-
Temperature	deg c	-	9.34	-	15.7700	8.47	-	14.39	14.7	6.9	15.2900	7.8	14.29	10.9	10.24	11.0	14.12
Turbidity	ntu	-	4.9	-	4.0000	5	-	8.5	68.3	1.89	3.0000	1	5	3	5	8	1.6
Metals																	
Iron (Dissolved Field)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	3.6	-	-	-
Iron (Dissolved Lab)	mg/L	-	-	-	-	1.4	-	-	-	-	-	-	-	5.5	-	-	-
Lead	mg/L	-	-	-	ND (0.0030)	-	-	-	-	-	ND (0.0030)	-	-	ND (0.0030)	-	-	-
Volatiles																	
1,1,1-Trichloroethane	µg/L	200	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0) U	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
1,1-Dichloroethane	µg/L	880	1.1	1.2	1.4	1.0	ND (1.0)	ND (1.0) U	0.44 J	2.0	2.0	2.6	2.7	4.5	4.9	4.3	4.3
1,1-Dichloroethene	µg/L	7.0	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0) U	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
Benzene	µg/L	5.0	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0) U	0.36 J	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	0.42 J
Carbon disulfide	µg/L	800	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0) U	0.18 J	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
Chlorobenzene	µg/L	100	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0) U	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
Chloroethane	µg/L	430	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0) U	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	0.54 J
cis-1,2-Dichloroethene	µg/L	70	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50) U	0.13 J	0.80	1.1	1.9	1.6	1.8	2.2	2.4	2.1
Methane	µg/L	-	-	-	-	3.2	-	-	-	-	-	1.5	-	67	-	-	-
Tetrachloroethene	µg/L	5.0	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0) U	0.14 J	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
Toluene	µg/L	790	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0) U	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
trans-1,2-Dichloroethene	µg/L	100	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50) U	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	0.19 J
Vinyl chloride	µg/L	2.0	ND (1.0)	ND (1.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0) U	ND (2.0)	ND (1.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	0.36 J

Notes:

J - Estimated.

ND - Non-detect at associated value.

U - Non-detect at associated value.

-- - Not applicable.

TABLE 3.4

**SUMMARY OF ANALYTICAL RESULTS
LOWER AQUIFER (MARCH 2002)
SPIEGELBERG SITE
LIVINGSTON COUNTY, MICHIGAN**

Sample Location:	Part 201 Criteria	CRA-MW-6 GW-3581-030202-BW-075 3/2/2002	CRA-MW-7 GW-3581-030202-BW-076 3/2/2002	OBG-4B GW-3581-030102-BW-073 3/1/2002	SP-MW-20D GW-3581-030102-BW-074 3/1/2002	SP-MW-51A GW-3581-030102-BW-069 3/1/2002
Parameter	Unit					
General Chemistry						
Conductivity	µmhos/cm	-	0.573	0.678	0.779	0.556
Dissolved Oxygen	mg/L	-	7.89	1.6	3.53	2.00
Oxidation reduction potential	millivolts	-	41	-28	55	-46
pH (water)	s.u.	-	7.92	7.4	7.18	7.71
Temperature	deg C	-	6.85	5.11	6.74	7.48
Turbidity	ntu	-	4.3	4.6	4.7	4.3
Volatiles						
1,1,1-Trichloroethane	µg/L	200	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,1,2,2-Tetrachloroethane	µg/L	8.5	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,1,2-Trichloroethane	µg/L	5	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,1-Dichloroethane	µg/L	880	ND (1.0)	31	1.6	ND (1.0)
1,1-Dichloroethene	µg/L	7	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,2-Dichloroethane	µg/L	5	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,2-Dichloropropane	µg/L	5	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
2-Butanone	µg/L	13,000	ND (10)	ND (10)	ND (10)	ND (10)
2-Hexanone	µg/L	1,000	ND (10)	ND (10)	ND (10)	ND (10)
4-Methyl-2-pentanone	µg/L	1,800	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Acetone	µg/L	730	ND (10)	ND (10)	ND (10)	ND (10)
Benzene	µg/L	5	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Bromodichloromethane	µg/L	100	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Bromoform	µg/L	100	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Bromomethane	µg/L	10	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Carbon disulfide	µg/L	800	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Carbon tetrachloride	µg/L	5	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Chlorobenzene	µg/L	100	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Chloroethane	µg/L	430	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
Chloroform (Trichloromethane)	µg/L	100	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Chloromethane	µg/L	260	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
cis-1,2-Dichloroethene	µg/L	70	ND (0.50)	0.50	ND (0.50)	ND (0.50)
cis-1,3-Dichloropropene	µg/L	21	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Dibromochloromethane	µg/L	100	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Ethylbenzene	µg/L	74	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Methylene chloride	µg/L	5	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Styrene	µg/L	100	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Tetrachloroethene	µg/L	5	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Toluene	µg/L	790	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
trans-1,2-Dichloroethene	µg/L	100	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
trans-1,3-Dichloropropene	µg/L	21	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Trichloroethene	µg/L	5	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Vinyl chloride	µg/L	2	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Xylene (total)	µg/L	280	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)

Notes:

ND - Non-detect at associated value.
-- Not applicable.

TABLE 3.5

**SUMMARY OF DETECTED COMPOUNDS
LOWER AQUIFER (JULY 1999 TO MARCH 2002)
SPIEGELBERG SITE
LIVINGSTON COUNTY, MICHIGAN**

<i>Sample Location:</i>		CRA-MW-6 3/2/02	CRA-MW-6 8/28/01	CRA-MW-6 1/11/01	CRA-MW-6 10/24/00	CRA-MW-6 4/11/00	CRA-MW-6 1/19/00	CRA-MW-6 10/13/99	CRA-MW-6 10/13/99 <i>Duplicate</i>	CRA-MW-6 7/7/99	CRA-MW-6 7/7/99 <i>Duplicate</i>
<i>Part 201</i>											
<i>Parameter</i>	<i>Units</i>										
<i>General Chemistry</i>											
Conductivity	µmhos/cm	-	0.573	0.5760	3.68	0.493	2.63	0.343	0.361	-	0.470
Dissolved Oxygen	mg/L	-	7.89	0.7000	4.11	1.54	1.08	4.08	3.76	-	9.74
Nitrate (Dissolved)	mg/L	-	-	ND (0.10)	-	-	ND (0.10)	-	-	-	-
Oxidation reduction potential	millivolts	-	41	-142.3000	-84	281	23.9	144	177.5	-	207.1
pH (water)	s.u.	-	7.92	-	-	-	-	-	-	-	-
pH Field	s.u.	-	-	7.0100	7.24	7.21	7.38	6.96	7.29	-	7.21
Sulfate (Filtered)	mg/L	-	-	41.7	-	-	38.9	-	-	-	-
Temperature	deg c	-	6.85	12.3000	10.1	12.81	9.39	8.67	10.57	-	11.71
Turbidity	ntu	-	4.3	4.5000	3	6	2	3	10.4	-	0.9
<i>Metals</i>											
Iron (Dissolved Field)	mg/L	-	-	-	-	-	0.7	-	-	-	-
Iron (Dissolved Lab)	mg/L	-	-	0.18	-	-	0.13	-	-	-	-
Lead	mg/L	-	-	ND (0.0030)	-	-	ND (0.0030)	-	-	-	-
<i>Volatiles</i>											
1,1,1-Trichloroethane	µg/L	200	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,1-Dichloroethane	µg/L	880	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Benzene	µg/L	5.0	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Carbon disulfide	µg/L	800	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Chloroethane	µg/L	430	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
cis-1,2-Dichloroethene	µg/L	70	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Methane	µg/L	-	-	75	-	-	0.74	-	-	-	-
Toluene	µg/L	790	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Vinyl chloride	µg/L	2.0	ND (1.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)

Notes:

- | - Estimated.
- ND - Non-detect at associated value.
- U - Non-detect at associated value.
- - Not applicable.

TABLE 3.5

**SUMMARY OF DETECTED COMPOUNDS
LOWER AQUIFER (JULY 1999 TO MARCH 2002)
SPIEGELBERG SITE
LIVINGSTON COUNTY, MICHIGAN**

<i>Sample Location:</i>		CRA-MW-7 3/2/02	CRA-MW-7 8/28/01	CRA-MW-7 1/11/01	CRA-MW-7 10/24/00	CRA-MW-7 4/11/00	CRA-MW-7 1/19/00	CRA-MW-7 10/13/99	CRA-MW-7 7/7/99
<i>Parameter</i>	<i>Units</i>	<i>Part 201</i> <i>Criteria</i>							
General Chemistry									
Conductivity	µmhos/cm	-	0.678	0.6780	0.635	0.603	4.29	0.439	0.470
Dissolved Oxygen	mg/L	-	1.6	0.5000	1.78	3.34	0.87	4.55	1.1
Nitrate (Dissolved)	mg/L	-	-	ND (0.10)	-	-	ND (0.10)	-	-
Oxidation reduction potential	millivolts	-	-28	-89.0000	-53	289	28.4	182.1	98.3
pH (water)	s.u.	-	7.4	-	-	-	-	-	-
pH Field	s.u.	-	-	6.8100	7.55	7.09	7.23	6.79	7.12
Sulfate (Filtered)	mg/L	-	-	36.2	-	-	34.0	-	-
Temperature	deg c	-	5.11	13.7900	11.97	12.47	9.08	8.81	10.95
Turbidity	ntu	-	4.6	5.0000	6	9	2	4	1
Metals									
Iron (Dissolved Field)	mg/L	-	-	-	-	-	ND (0.10)	-	-
Iron (Dissolved Lab)	mg/L	-	-	0.29	-	-	0.18	-	-
Lead	mg/L	-	-	ND (0.0030)	-	-	ND (0.0030)	-	-
Volatiles									
1,1,1-Trichloroethane	µg/L	200	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,1-Dichloroethane	µg/L	880	31	26	39	41	38	33	28
Benzene	µg/L	5.0	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Carbon disulfide	µg/L	800	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Chloroethane	µg/L	430	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	0.58]
cis-1,2-Dichloroethene	µg/L	70	0.50	ND (0.50)	0.53	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Methane	µg/L	-	-	110	-	-	36	-	-
Toluene	µg/L	790	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Vinyl chloride	µg/L	2.0	ND (1.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)

Notes:

-] - Estimated.
- ND - Non-detect at associated value.
- U - Non-detect at associated value.
- - Not applicable.

TABLE 3.5

**SUMMARY OF DETECTED COMPOUNDS
LOWER AQUIFER (JULY 1999 TO MARCH 2002)
SPIEGELBERG SITE
LIVINGSTON COUNTY, MICHIGAN**

<i>Sample Location:</i>		OBG-4B 3/1/02	OBG-4B 8/24/01	OBG-4B 1/11/01	OBG-4B 10/25/00	OBG-4B 10/25/00 <i>Duplicate</i>	OBG-4B 4/12/00	OBG-4B 1/19/00	OBG-4B 10/14/99	OBG-4B 7/8/99
<i>Part 201</i>										
<i>Parameter</i>	<i>Units</i>									
<i>General Chemistry</i>										
Conductivity	µhos/cm	-	0.779	0.7680	0.655	0.57	-	3	0.365	0.380
Dissolved Oxygen	mg/L	-	3.53	2.6100	0.92	2.33	-	1.36	1.91	1.03
Nitrate (Dissolved)	mg/L	-	-	ND (0.10)	-	-	-	ND (0.10)	-	0.88
Oxidation reduction potential	millivolts	-	55	-82.3000	-92	195	-	-94.2	-91.9	-96.7
pH (water)	s.u.	-	7.18	-	-	-	-	-	-	-107
pH Field	s.u.	-	-	6.6500	7.5	7.09	-	7.23	6.84	7.15
Sulfate (Filtered)	mg/L	-	-	56.0	-	-	-	26.4	-	-
Temperature	deg c	-	6.74	16.8500	10.11	12.41	-	11.47	9.44	12.7
Turbidity	ntu	-	4.7	3.0000	14	10	-	8	5	5
<i>Metals</i>										
Iron (Dissolved Field)	mg/L	-	-	-	-	-	-	0.7	-	-
Iron (Dissolved Lab)	mg/L	-	-	2.1	-	-	-	1.9	-	-
Lead	mg/L	-	-	ND (0.0030)	-	-	-	ND (0.0030)	-	-
<i>Volatiles</i>										
1,1,1-Trichloroethane	µg/L	200	ND (1.0)	ND (1.0)	6.3	3.2	3.2	ND (1.0)	4.2	ND (1.0) UJ
1,1-Dichloroethane	µg/L	880	1.6	1.6	1.9	1.4	1.4	ND (1.0)	ND (1.0)	1.2 J
Benzene	µg/L	5.0	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	1.0	1.6	ND (1.0) UJ
Carbon disulfide	µg/L	800	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0) UJ	0.25 J
Chloroethane	µg/L	430	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
cis-1,2-Dichloroethene	µg/L	70	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50) UJ
Methane	µg/L	-	-	120	-	-	-	34	-	-
Toluene	µg/L	790	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0) UJ	0.38 J
Vinyl chloride	µg/L	2.0	ND (1.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0) UJ	ND (2.0)

Notes:

- I - Estimated
- ND - Non-detect at associated value.
- U - Non-detect at associated value.
- - Not applicable.

TABLE 3.5

**SUMMARY OF DETECTED COMPOUNDS
LOWER AQUIFER (JULY 1999 TO MARCH 2002)
SPIEGELBERG SITE
LIVINGSTON COUNTY, MICHIGAN**

Sample Location:		SP-MW-20D 3/1/02	SP-MW-20D 8/24/01	SP-MW-20D 1/11/01	SP-MW-20D 10/24/00	SP-MW-20D 4/12/00	SP-MW-20D 1/19/00	SP-MW-20D 10/14/99	SP-MW-20D 7/7/99
Parameter	Units	Part 201 Criteria							
General Chemistry									
Conductivity	µmhos/cm	-	0.556	0.5840	0.564	0.547	3.33	0.361	0.424
Dissolved Oxygen	mg/L	-	2.00	0.7000	0.82	0.63	1.61	1.97	1.31
Nitrate (Dissolved)	mg/L	-	-	ND (0.10)	-	-	ND (0.10)	-	0.86
Oxidation reduction potential	millivolts	-	-46	-167.0000	-194	142	-154.9	-141	-114.4
pH (water)	s.u.	-	7.71	-	-	-	-	-	-229.5
pH Field	s.u.	-	-	7.1500	7.92	7.6	7.64	7.26	7.52
Sulfate (Filtered)	mg/L	-	-	31.8	-	-	70.6	-	-
Temperature	deg c	-	7.48	17.3100	9.2	15.33	11.2	8.11	12.21
Turbidity	ntu	-	4.3	3.0000	5	4.5	5	2	7
Metals									
Iron (Dissolved Field)	mg/L	-	-	-	-	-	ND (0.10)	-	-
Iron (Dissolved Lab)	mg/L	-	-	0.25	-	-	1.1	-	-
Lead	mg/L	-	-	ND (0.0030)	-	-	ND (0.0030)	-	-
Volatiles									
1,1,1-Trichloroethane	µg/L	200	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,1-Dichloroethane	µg/L	880	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Benzene	µg/L	5.0	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	0.14 J
Carbon disulfide	µg/L	800	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Chloroethane	µg/L	430	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
cis-1,2-Dichloroethene	µg/L	70	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Methane	µg/L	-	-	800	-	890	-	-	-
Toluene	µg/L	790	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	0.18 J
Vinyl chloride	µg/L	2.0	ND (1.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	0.87 J

Notes:

J - Estimated.

ND - Non-detect at associated value.

U - Non-detect at associated value.

-- - Not applicable.

TABLE 3.5

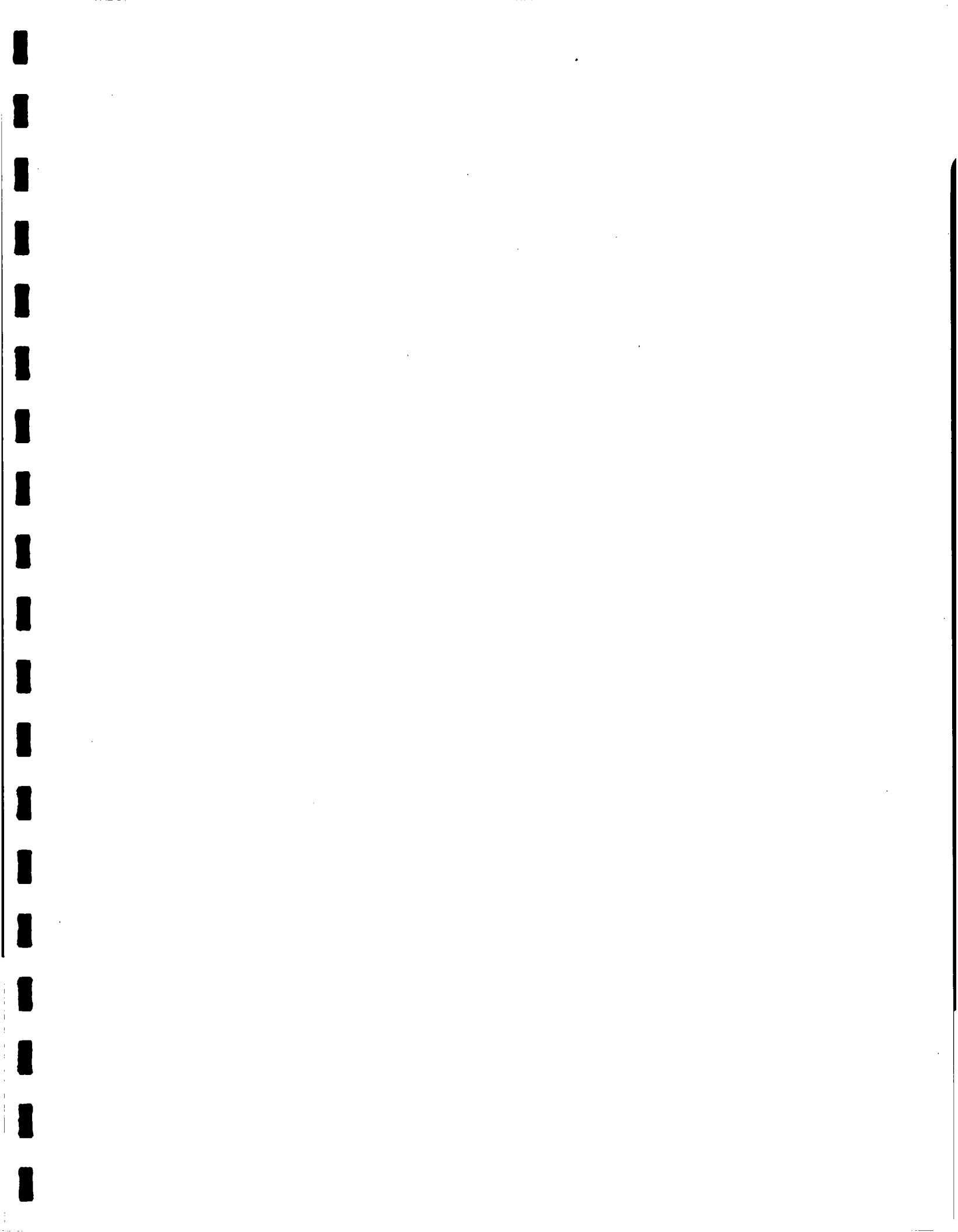
**SUMMARY OF DETECTED COMPOUNDS
LOWER AQUIFER (JULY 1999 TO MARCH 2002)**
SPIEGELBERG SITE
LIVINGSTON COUNTY, MICHIGAN

Sample Location:		SP-MW-51A 3/1/02	SP-MW-51A 8/24/01	SP-MW-51A 8/24/01 Duplicate	SP-MW-51A 1/10/01	SP-MW-51A 1/10/01 Duplicate	SP-MW-51A 10/25/00	SP-MW-51A 4/12/00	SP-MW-51A 1/18/00	SP-MW-51A 10/14/99	SP-MW-51A 7/8/99
<i>Sample Date:</i>											
<i>Part 201</i>											
Parameter	Units	Criteria									
<i>General Chemistry</i>											
Conductivity	µmhos/cm	-	0.740	0.4820	-	0.583	-	0.416	3.1	0.344	0.421
Dissolved Oxygen	mg/L	-	1.18	9.4000	-	0.70	-	2.73	2.01	1.96	0.82
Nitrate (Dissolved)	mg/L	-	-	ND (0.10)	ND (0.10)	-	-	-	ND (0.10)	-	-
Oxidation reduction potential	millivolts	-	-4	-113.2000	-	-105	-	311	-119.1	-61.4	-127
pH (water)	s.u.	-	7.45	-	-	-	-	-	-	-	-
pH Field	s.u.	-	-	7.3200	-	7.61	-	7.87	7.38	7.05	7.42
Sulfate (Filtered)	mg/L	-	-	22.9	23.8	-	-	-	30.4	-	-
Temperature	deg c	-	8.61	15.7900	-	10.91	-	13.36	11.08	6.7	12.3
Turbidity	ntu	-	4.61	4.0000	-	4	-	4	5	5	31
<i>Metals</i>											
Iron (Dissolved Field)	mg/L	-	-	-	-	-	-	0.7	-	-	-
Iron (Dissolved Lab)	mg/L	-	-	1.5	1.5	-	-	1.6	-	-	-
Lead	mg/L	-	-	0.0089	0.0090	-	-	0.0033	-	-	-
<i>Volatiles</i>											
1,1,1-Trichloroethane	µg/L	200	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,1-Dichloroethane	µg/L	880	3.2	3.8	3.9	3.3	3.3	4.7	5.6	5.8	7.8
Benzene	µg/L	5.0	1.1	1.3	1.2	1.8	1.8	ND (1.0)	1.5	ND (1.0)	ND (1.0)
Carbon disulfide	µg/L	800	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	0.39
Chloroethane	µg/L	430	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	2.4
cis-1,2-Dichloroethene	µg/L	70	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	0.58	ND (0.50)	0.64
Methane	µg/L	-	-	360	220	-	-	120	-	-	-
Toluene	µg/L	790	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Vinyl chloride	µg/L	2.0	ND (1.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	1.9

Notes:

- I - Estimated.
- ND - Non-detect at associated value.
- U - Non-detect at associated value.
- - Not applicable.

APPENDICES



APPENDIX A

CONTINGENCY PLAN

APPENDIX A

CONTINGENCY PLAN

The following section presents the proposed contingency measures and the conditions under which these would be triggered.

At this Site, the operation of the groundwater remediation system has resulted in an excellent understanding of the hydraulic response of the Upper Aquifer and Lower Aquifer to pumping and re-injection. Also, the rate of groundwater flow in the Lower Aquifer downgradient of the former source area is very slow (approximately 3.1 feet/year). Therefore, sufficient time is available to evaluate chemical monitoring data prior to implementing any contingency measures.

The existing groundwater remediation system will be maintained in working condition during the intermittent pumping period. The contingency remedy for the Site will be the operation of all or part of the existing groundwater remediation system should this be required. This system is already constructed and its operation could readily be initiated should Site conditions warrant.

Groundwater monitoring data from the RI and RD (i.e., prior to the remedial action) showed that even though some compound concentrations in the former source area exceeded MDEQ Part 201 residential cleanup criteria, there was no downgradient impact. This fact was supported by the fate and transport analysis for vinyl chloride presented in the petition for intermittent operation (CRA, February 1988). This conservative evaluation showed that even if a constant source of vinyl chloride of 17 µg/L was assumed, migration beyond 150 feet would not occur. Based on this measured and predictive evidence, it is not necessary to compare Site monitoring data to MDEQ Part 201 residential cleanup criteria to determine the need for contingency measures. It is appropriate to develop trigger concentrations for critical compounds in the former source area against which Site monitoring data will be compared.

For the evaluation of the need for contingency measures, vinyl chloride and benzene are the sentinel compounds. These compounds are SOW-targeted compounds and represent the chlorinated and aromatic VOC groups. Vinyl chloride was historically detected in a number of Site monitoring wells. However, since 1997 vinyl chloride has only been detected in Lower Aquifer monitoring well SP-MW-51A. During 1997, three rounds of sampling were performed on this well. The results of these analyses showed the following concentrations of vinyl chloride: 7 µg/L (May 1997); 6 µg/L in the investigative and duplicate samples (July 1997); 4 µg/L (October 1997); and, non-detect

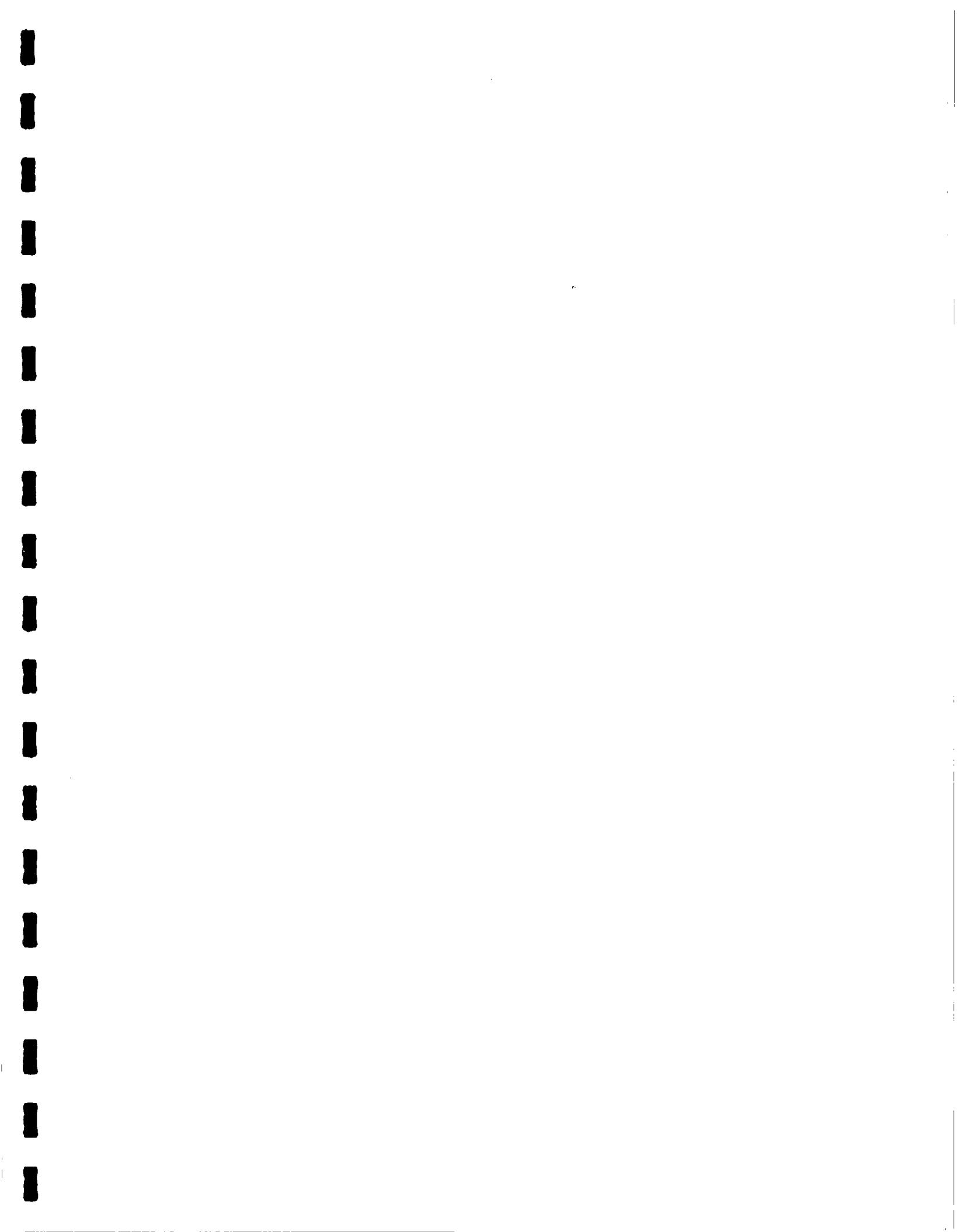
(April 1998). The average of the four samples with detectable concentrations collected during the three events is approximately 6 µg/L. The presence of these concentrations of vinyl chloride did not result in any downgradient detections. Therefore, it is proposed that 6 µg/L be used as a trigger concentration for vinyl chloride in the source area monitoring wells.

Benzene was historically detected in the Site groundwater. However, during 1997 benzene was not detected in any Site monitoring wells. It is proposed that the trigger concentration for benzene be set at 5 µg/L (equivalent to the MDEQ Part 201 residential cleanup criterion) in all monitoring wells.

For the proposed downgradient sentry monitoring wells, any exceedance of the MDEQ Part 201 residential cleanup criteria will trigger the evaluation of contingencies.

The need for any contingency actions will be based on the following procedure:

1. Site analytical data will be compared to the trigger concentrations. If there are no exceedances, the evaluation will cease. If an exceedance is noted, notify USEPA and MDEQ and proceed to Step 2.
2. Within 60 days of the receipt of the results of the sample event in Step 1, two duplicate groundwater samples will be collected from the monitoring well(s) in which the exceedance occurred. If the re-sampling event does not confirm the exceedance, the evaluation will cease. If the exceedance of the trigger concentration is confirmed, proceed to Step 3.
3. If the exceedance is confirmed, a report will be prepared recommending appropriate response actions for USEPA approval.



APPENDIX B

LABORATORY REPORT

SEVERN
TRENT
SERVICES

STL North Canton
4101 Shuffel Drive NW
North Canton, OH 44720-6961

Tel: 330 497 9396
Fax: 330 497 0772
www.stl-inc.com

ANALYTICAL REPORT

3581
MONITORING DATA

PROJECT NO. 3581

SPIEGELBERG

Lot #: A2C050137

Stephanie Tomka

Conestoga-Rovers & Assoc., Ltd.
651 Colby Dr.
Waterloo, Ontario, N2V 1C2

SEVERN TRENT LABORATORIES, INC.

Amy McCormick
Amy L. McCormick
Project Manager

March 26, 2002

CASE NARRATIVE

A2C050137

The following report contains the analytical results for ten water samples and one quality control sample submitted to STL North Canton by Conestoga-Rovers & Associates, Ltd. from the Spiegelberg Site, project number 3581. The samples were received March 5, 2002, according to documented sample acceptance procedures.

STL utilizes USEPA approved methods in all analytical work. The samples presented in this report were analyzed for the parameters listed on the analytical methods summary page in accordance with the method indicated. Preliminary results were provided to Stephanie Tomka and Paul Wiseman on March 14, 2002. A summary of QC data for these analyses is included at the rear of the report.

The results included in this report have been reviewed for compliance with the laboratory QA/QC plan. All data have been found to be compliant with laboratory protocol.

QUALITY CONTROL ELEMENTS OF SW-846 METHODS

STL North Canton conducts a quality assurance/quality control (QA/QC) program designed to provide scientifically valid and legally defensible data. Toward this end, several types of quality control indicators are incorporated into the QA/QC program, which is described in detail in QA Policy, QA-003. These indicators are introduced into the sample testing process to provide a mechanism for the assessment of the analytical data.

QC BATCH

Environmental samples are taken through the testing process in groups called QUALITY CONTROL BATCHES (QC batches). A QC batch contains up to twenty environmental samples of a similar matrix (water, soil) that are processed using the same reagents and standards. STL North Canton requires that each environmental sample be associated with a QC batch.

Several quality control samples are included in each QC batch and are processed identically to the twenty environmental samples. These QC samples include a METHOD BLANK (MB), a LABORATORY CONTROL SAMPLE (LCS) and, where appropriate, a MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD) pair or a MATRIX SPIKE/SAMPLE DUPLICATE (MS/DU) pair. If there is insufficient sample to perform an MS/MSD or an MS/DU, then a LABORATORY CONTROL SAMPLE DUPLICATE (LCSD) is included in the QC batch.

LABORATORY CONTROL SAMPLE

The Laboratory Control Sample is a QC sample that is created by adding known concentrations of a full or partial set of target analytes to a matrix similar to that of the environmental samples in the QC batch. The LCS analyte recovery results are used to monitor the analytical process and provide evidence that the laboratory is performing the method within acceptable guidelines. All control analytes indicated by a bold type in the LCS must meet acceptance criteria. Failure to meet the established recovery guidelines requires the repreparation and reanalysis of all samples in the QC batch. The only exception is that if the LCS recoveries are biased high and the associated sample is ND (non-detected) for the parameter(s) of interest, the batch is acceptable.

At times, a Laboratory Control Sample Duplicate (LCSD) is also included in the QC batch. An LCSD is a QC sample that is created and handled identically to the LCS. Analyte recovery data from the LCSD is assessed in the same way as that of the LCS. The LCSD recoveries, together with the LCS recoveries, are used to determine the reproducibility (precision) of the analytical system. Precision data are expressed as relative percent differences (RPDs). If the RPD fails for an LCS/LCSD and yet the recoveries are within acceptance criteria, the batch is still acceptable.

METHOD BLANK

The Method Blank is a QC sample consisting of all the reagents used in analyzing the environmental samples contained in the QC batch. Method Blank results are used to determine if interference or contamination in the analytical system could lead to the reporting of false positive data or elevated analyte concentrations. All target analytes must be below the reporting limits (RL) or the associated sample(s) must be ND except under the following circumstances:

- Common organic contaminants may be present at concentrations up to 5 times the reporting limits. Common metals contaminants may be present at concentrations up to 2 times the reporting limit, or the reported blank concentration must be twenty fold less than the concentration reported in the associated environmental samples. (See common laboratory contaminants listed below.)

Volatile (GC or GC/MS)

Methylene chloride
Acetone
2-Butanone

Semivolatile (GC/MS)

Phthalate Esters

Metals

Copper
Iron
Zinc
Lead*

- *for analyses run on TJA Trace ICP, ICPMS or GFAA only*

- Organic blanks will be accepted if compounds detected in the blank are present in the associated samples at levels 10 times the blank level. Inorganic blanks will be accepted if elements detected in the blank are present in the associated samples at 20 times the blank level.

QUALITY CONTROL ELEMENTS OF SW-846 METHODS (Continued)

- Blanks will be accepted if the compounds/elements detected are not present in any of the associated environmental samples.

Failure to meet these Method Blank criteria requires the repreparation and reanalysis of all samples in the QC batch.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

A Matrix Spike and a Matrix Spike Duplicate are a pair of environmental samples to which known concentrations of a full or partial set of target analytes are added. The MS/MSD results are determined in the same manner as the results of the environmental sample used to prepare the MS/MSD. The analyte recoveries and the relative percent differences (RPDs) of the recoveries are calculated and used to evaluate the effect of the sample matrix on the analytical results. Due to the potential variability of the matrix of each sample, the MS/MSD results may not have an immediate bearing on any samples except the one spiked; therefore, the associated batch MS/MSD may not reflect the same compounds as the samples contained in the analytical report. When these MS/MSD results fail to meet acceptance criteria, the data is evaluated. If the LCS is within acceptance criteria, the batch is considered acceptable. The acceptance criteria do not apply to samples that are diluted for organics if the native sample amount is 4x the concentration of the spike.

For certain methods, a Matrix Spike/Sample Duplicate (MS/DU) may be included in the QC batch in place of the MS/MSD. For the parameters (i.e. pH, ignitability) where it is not possible to prepare a spiked sample, a Sample Duplicate may be included in the QC batch. However, a Sample Duplicate is less likely to provide usable precision statistics depending on the likelihood of finding concentrations below the standard reporting limit. When the Sample Duplicate result fails to meet acceptance criteria, the data is evaluated.

SURROGATE COMPOUNDS

In addition to these batch-related QC indicators, each organic environmental and QC sample is spiked with surrogate compounds. Surrogates are organic chemicals that behave similarly to the analytes of interest and that are rarely present in the environment. Surrogate recoveries are used to monitor the individual performance of a sample in the analytical system.

If surrogate recoveries are biased high in the LCS, LCSD, or the Method Blank, and the associated sample(s) are ND, the batch is acceptable. Otherwise, if the LCS, LCSD, or Method Blank surrogate(s) fail to meet recovery criteria, the entire sample batch is reprepped and reanalyzed. If the surrogate recoveries are outside criteria for environmental samples, the samples will be reprepped and reanalyzed unless there is objective evidence of matrix interference or if the sample dilution is greater than the threshold outlined in the associated method SOP.

For the GC/MS BNA methods, the surrogate criterion is that two of the three surrogates for each fraction must meet acceptance criteria. The third surrogate must have a recovery of ten percent or greater.

For the Pesticide, PCB, PAH, and Herbicide methods, the surrogate criterion is that one of two surrogate compounds must meet acceptance criteria.

STL North Canton Certifications and Approvals:

Alabama (#41170), California (#2157), Connecticut (#PH-0590), Florida (#E87225),
Illinois (#100439), Kansas (#E10336), Kentucky (#90021), Massachusetts (#M-OH048),
Maryland (#272), Minnesota (#39-999-348), Missouri (#6090), New Jersey (#74001),
New York (#10975), North Dakota (#R-156), Ohio (#6090), Ohio VAP (#CL0024),
Pennsylvania (#68-340), Rhode Island (#237), South Carolina (#92007001, #92007002, #92007003),
Tennessee (#02903), West Virginia (#210), Wisconsin (#999518190), NAVY, ARMY,
USDA Soil Permit. ACIL Seal of Excellence – Participating Lab Status Award (#82)



ANALYTICAL METHODS SUMMARY

A2C050137

<u>PARAMETER</u>	<u>ANALYTICAL METHOD</u>
Volatile Organics by GC/MS	SW846 8260B

References:

SW846 "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 and its updates.

SAMPLE SUMMARY

A2C050137

WO #	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
EVXAF	001	GW-3581-030102-BW-067	03/01/02	09:41
EVXAK	002	GW-3581-030102-BW-068	03/01/02	10:41
EVXAL	003	GW-3581-030102-BW-069	03/01/02	12:01
EVXAQ	004	GW-3581-030102-BW-070	03/01/02	13:52
EVXAR	005	GW-3581-030102-BW-071	03/01/02	14:00
EVXAV	006	GW-3581-030102-BW-072	03/01/02	14:38
EVXAW	007	GW-3581-030102-BW-073	03/01/02	15:32
EVXAX	008	GW-3581-030102-BW-074	03/01/02	16:23
EVXA0	009	GW-3581-030202-BW-075	03/02/02	09:03
EVXA2	010	GW-3581-030202-BW-076	03/02/02	09:58
EVXA3	011	TRIP BLANK	03/02/02	

NOTE (S) :

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

CONESTOGA-ROVERS & ASSOC., LTD.

Client Sample ID: GW-3581-030102-BW-067

GC/MS Volatiles

Lot-Sample #....: A2C050137-001 Work Order #....: EVXAF1AA Matrix.....: WG
 Date Sampled...: 03/01/02 09:41 Date Received...: 03/05/02
 Prep Date.....: 03/09/02 Analysis Date...: 03/09/02
 Prep Batch #....: 2069100
 Dilution Factor: 1 Method.....: SW846 8260B

<u>PARAMETER</u>	<u>RESULT</u>	<u>REPORTING LIMIT</u>	<u>UNITS</u>
Chloromethane	ND	2.0	ug/L
Bromomethane	ND	1.0	ug/L
Vinyl chloride	ND	1.0	ug/L
Chloroethane	ND	2.0	ug/L
Methylene chloride	ND	1.0	ug/L
Acetone	ND	10	ug/L
Carbon disulfide	ND	1.0	ug/L
1,1-Dichloroethene	ND	1.0	ug/L
1,1-Dichloroethane	2.0	1.0	ug/L
Chloroform	ND	1.0	ug/L
1,2-Dichloroethane	ND	1.0	ug/L
2-Butanone	ND	10	ug/L
1,1,1-Trichloroethane	ND	1.0	ug/L
Carbon tetrachloride	ND	1.0	ug/L
Bromodichloromethane	ND	1.0	ug/L
1,2-Dichloropropane	ND	1.0	ug/L
cis-1,3-Dichloropropene	ND	1.0	ug/L
Trichloroethene	ND	1.0	ug/L
Dibromochloromethane	ND	1.0	ug/L
1,1,2-Trichloroethane	ND	1.0	ug/L
Benzene	ND	1.0	ug/L
trans-1,3-Dichloropropene	ND	1.0	ug/L
Bromoform	ND	1.0	ug/L
4-Methyl-2-pentanone	ND	5.0	ug/L
2-Hexanone	ND	10	ug/L
Tetrachloroethene	ND	1.0	ug/L
1,1,2,2-Tetrachloroethane	ND	1.0	ug/L
Toluene	ND	1.0	ug/L
Chlorobenzene	ND	1.0	ug/L
Ethylbenzene	ND	1.0	ug/L
Styrene	ND	1.0	ug/L
Xylenes (total)	ND	1.0	ug/L
cis-1,2-Dichloroethene	0.80	0.50	ug/L
trans-1,2-Dichloroethene	ND	0.50	ug/L

<u>SURROGATE</u>	<u>PERCENT RECOVERY</u>	<u>RECOVERY LIMITS</u>
Dibromofluoromethane	103	(73 - 122)
1,2-Dichloroethane-d4	98	(61 - 128)
Toluene-d8	96	(76 - 110)
4-Bromofluorobenzene	94	(74 - 116)

CONESTOGA-ROVERS & ASSOC., LTD.

Client Sample ID: GW-3581-030102-BW-068

GC/MS Volatiles

Lot-Sample #....: A2C050137-002 Work Order #....: EVXAK1AA Matrix.....: WG
 Date Sampled...: 03/01/02 10:41 Date Received...: 03/05/02
 Prep Date.....: 03/09/02 Analysis Date...: 03/09/02
 Prep Batch #....: 2069100
 Dilution Factor: 1 Method.....: SW846 8260B

<u>PARAMETER</u>	<u>RESULT</u>	<u>REPORTING LIMIT</u>	<u>UNITS</u>
Chloromethane	ND	2.0	ug/L
Bromomethane	ND	1.0	ug/L
Vinyl chloride	ND	1.0	ug/L
Chloroethane	ND	2.0	ug/L
Methylene chloride	ND	1.0	ug/L
1,1-Dichloroethene	ND	1.0	ug/L
1,1-Dichloroethane	1.6	1.0	ug/L
Chloroform	ND	1.0	ug/L
Acetone	ND	10	ug/L
Carbon disulfide	ND	1.0	ug/L
1,2-Dichloroethane	ND	1.0	ug/L
2-Butanone	ND	10	ug/L
1,1,1-Trichloroethane	ND	1.0	ug/L
Carbon tetrachloride	ND	1.0	ug/L
Bromodichloromethane	ND	1.0	ug/L
1,2-Dichloropropane	ND	1.0	ug/L
cis-1,3-Dichloropropene	ND	1.0	ug/L
Trichloroethene	ND	1.0	ug/L
Dibromochloromethane	ND	1.0	ug/L
1,1,2-Trichloroethane	ND	1.0	ug/L
Benzene	4.4	1.0	ug/L
trans-1,3-Dichloropropene	ND	1.0	ug/L
Bromoform	ND	1.0	ug/L
4-Methyl-2-pentanone	ND	5.0	ug/L
2-Hexanone	ND	10	ug/L
Tetrachloroethene	ND	1.0	ug/L
1,1,2,2-Tetrachloroethane	ND	1.0	ug/L
Toluene	ND	1.0	ug/L
Chlorobenzene	4.6	1.0	ug/L
Ethylbenzene	ND	1.0	ug/L
Styrene	ND	1.0	ug/L
Xylenes (total)	ND	1.0	ug/L
cis-1,2-Dichloroethene	ND	0.50	ug/L
trans-1,2-Dichloroethene	ND	0.50	ug/L

<u>SURROGATE</u>	<u>PERCENT RECOVERY</u>	<u>RECOVERY LIMITS</u>
Dibromofluoromethane	100	(73 - 122)
1,2-Dichloroethane-d4	96	(61 - 128)
Toluene-d8	97	(76 - 110)
4-Bromofluorobenzene	95	(74 - 116)

CONESTOGA-ROVERS & ASSOC., LTD.

Client Sample ID: GW-3581-030102-BW-069

GC/MS Volatiles

Lot-Sample #....: A2C050137-003 Work Order #....: EVXAL1AA Matrix.....: WG
 Date Sampled....: 03/01/02 12:01 Date Received...: 03/05/02
 Prep Date.....: 03/09/02 Analysis Date...: 03/09/02
 Prep Batch #....: 2069100
 Dilution Factor: 1 Method.....: SW846 8260B

<u>PARAMETER</u>	<u>RESULT</u>	<u>REPORTING LIMIT</u>	<u>UNITS</u>
Carbon tetrachloride	ND	1.0	ug/L
Bromodichloromethane	ND	1.0	ug/L
2-Butanone	ND	10	ug/L
1,1,1-Trichloroethane	ND	1.0	ug/L
Chloromethane	ND	2.0	ug/L
Bromomethane	ND	1.0	ug/L
Vinyl chloride	ND	1.0	ug/L
Chloroethane	ND	2.0	ug/L
Methylene chloride	ND	1.0	ug/L
Acetone	ND	10	ug/L
Carbon disulfide	ND	1.0	ug/L
1,1-Dichloroethene	ND	1.0	ug/L
1,1-Dichloroethane	3.2	1.0	ug/L
Chloroform	ND	1.0	ug/L
1,2-Dichloroethane	ND	1.0	ug/L
1,2-Dichloropropane	ND	1.0	ug/L
cis-1,3-Dichloropropene	ND	1.0	ug/L
Trichloroethene	ND	1.0	ug/L
Dibromochloromethane	ND	1.0	ug/L
1,1,2-Trichloroethane	ND	1.0	ug/L
Benzene	1.1	1.0	ug/L
trans-1,3-Dichloropropene	ND	1.0	ug/L
Bromoform	ND	1.0	ug/L
4-Methyl-2-pentanone	ND	5.0	ug/L
2-Hexanone	ND	10	ug/L
Tetrachloroethene	ND	1.0	ug/L
1,1,2,2-Tetrachloroethane	ND	1.0	ug/L
Toluene	ND	1.0	ug/L
Chlorobenzene	ND	1.0	ug/L
Ethylbenzene	ND	1.0	ug/L
Styrene	ND	1.0	ug/L
Xylenes (total)	ND	1.0	ug/L
cis-1,2-Dichloroethene	ND	0.50	ug/L
trans-1,2-Dichloroethene	ND	0.50	ug/L

<u>SURROGATE</u>	<u>PERCENT RECOVERY</u>	<u>RECOVERY LIMITS</u>
Dibromofluoromethane	103	(73 - 122)
1,2-Dichloroethane-d4	95	(61 - 128)
Toluene-d8	93	(76 - 110)
4-Bromofluorobenzene	91	(74 - 116)

CONESTOGA-ROVERS & ASSOC., LTD.

Client Sample ID: GW-3581-030102-BW-070

GC/MS Volatiles

Lot-Sample #....: A2C050137-004 Work Order #....: EVXAQ1AA Matrix.....: WG
 Date Sampled...: 03/01/02 13:52 Date Received...: 03/05/02
 Prep Date.....: 03/09/02 Analysis Date...: 03/09/02
 Prep Batch #....: 2069100
 Dilution Factor: 1 Method.....: SW846 8260B

<u>PARAMETER</u>	<u>RESULT</u>	<u>REPORTING LIMIT</u>	<u>UNITS</u>
Chloromethane	ND	2.0	ug/L
Bromomethane	ND	1.0	ug/L
Vinyl chloride	ND	1.0	ug/L
Chloroethane	ND	2.0	ug/L
Methylene chloride	ND	1.0	ug/L
Acetone	ND	10	ug/L
Carbon disulfide	ND	1.0	ug/L
1,1-Dichloroethene	ND	1.0	ug/L
1,1-Dichloroethane	1.1	1.0	ug/L
Chloroform	ND	1.0	ug/L
1,2-Dichloroethane	ND	1.0	ug/L
2-Butanone	ND	10	ug/L
1,1,1-Trichloroethane	ND	1.0	ug/L
Carbon tetrachloride	ND	1.0	ug/L
Bromodichloromethane	ND	1.0	ug/L
1,2-Dichloropropane	ND	1.0	ug/L
cis-1,3-Dichloropropene	ND	1.0	ug/L
Trichloroethene	ND	1.0	ug/L
Dibromochloromethane	ND	1.0	ug/L
1,1,2-Trichloroethane	ND	1.0	ug/L
Benzene	ND	1.0	ug/L
trans-1,3-Dichloropropene	ND	1.0	ug/L
Bromoform	ND	1.0	ug/L
4-Methyl-2-pentanone	ND	5.0	ug/L
2-Hexanone	ND	10	ug/L
Tetrachloroethene	ND	1.0	ug/L
1,1,2,2-Tetrachloroethane	ND	1.0	ug/L
Toluene	ND	1.0	ug/L
Chlorobenzene	ND	1.0	ug/L
Ethylbenzene	ND	1.0	ug/L
Styrene	ND	1.0	ug/L
Xylenes (total)	ND	1.0	ug/L
cis-1,2-Dichloroethene	ND	0.50	ug/L
trans-1,2-Dichloroethene	ND	0.50	ug/L

<u>SURROGATE</u>	<u>PERCENT RECOVERY</u>	<u>RECOVERY LIMITS</u>
Dibromofluoromethane	102	(73 - 122)
1,2-Dichloroethane-d4	94	(61 - 128)
Toluene-d8	95	(76 - 110)
4-Bromofluorobenzene	91	(74 - 116)

CONESTOGA-ROVERS & ASSOC., LTD.

Client Sample ID: GW-3581-030102-BW-071

GC/MS Volatiles

Lot-Sample #....: A2C050137-005 Work Order #....: EVXAR1AA Matrix.....: WG
 Date Sampled....: 03/01/02 14:00 Date Received...: 03/05/02
 Prep Date.....: 03/09/02 Analysis Date...: 03/09/02
 Prep Batch #....: 2069100
 Dilution Factor: 1 Method.....: SW846 8260B

<u>PARAMETER</u>	<u>RESULT</u>	<u>REPORTING LIMIT</u>	<u>UNITS</u>
Chloromethane	ND	2.0	ug/L
Bromomethane	ND	1.0	ug/L
Vinyl chloride	ND	1.0	ug/L
Chloroethane	ND	2.0	ug/L
Methylene chloride	ND	1.0	ug/L
Acetone	ND	10	ug/L
Carbon disulfide	ND	1.0	ug/L
1,1-Dichloroethene	ND	1.0	ug/L
1,1-Dichloroethane	1.2	1.0	ug/L
Chloroform	ND	1.0	ug/L
1,2-Dichloroethane	ND	1.0	ug/L
2-Butanone	ND	10	ug/L
1,1,1-Trichloroethane	ND	1.0	ug/L
Carbon tetrachloride	ND	1.0	ug/L
Bromodichloromethane	ND	1.0	ug/L
1,2-Dichloropropane	ND	1.0	ug/L
cis-1,3-Dichloropropene	ND	1.0	ug/L
Trichloroethene	ND	1.0	ug/L
Dibromochloromethane	ND	1.0	ug/L
1,1,2-Trichloroethane	ND	1.0	ug/L
Benzene	ND	1.0	ug/L
trans-1,3-Dichloropropene	ND	1.0	ug/L
Bromoform	ND	1.0	ug/L
4-Methyl-2-pentanone	ND	5.0	ug/L
2-Hexanone	ND	10	ug/L
Tetrachloroethene	ND	1.0	ug/L
1,1,2,2-Tetrachloroethane	ND	1.0	ug/L
Toluene	ND	1.0	ug/L
Chlorobenzene	ND	1.0	ug/L
Ethylbenzene	ND	1.0	ug/L
Styrene	ND	1.0	ug/L
trans-1,2-Dichloroethene	ND	0.50	ug/L
Xylenes (total)	ND	1.0	ug/L
cis-1,2-Dichloroethene	ND	0.50	ug/L

<u>SURROGATE</u>	<u>PERCENT RECOVERY</u>	<u>RECOVERY LIMITS</u>
Dibromofluoromethane	102	(73 - 122)
1,2-Dichloroethane-d4	98	(61 - 128)
Toluene-d8	95	(76 - 110)
4-Bromofluorobenzene	91	(74 - 116)

CONESTOGA-ROVERS & ASSOC., LTD.

Client Sample ID: GW-3581-030102-BW-072

GC/MS Volatiles

Lot-Sample #....: A2C050137-006 Work Order #....: EVXAV1AA Matrix.....: WG
 Date Sampled....: 03/01/02 14:38 Date Received...: 03/05/02
 Prep Date.....: 03/09/02 Analysis Date...: 03/09/02
 Prep Batch #....: 2069100
 Dilution Factor: 1 Method.....: SW846 8260B

<u>PARAMETER</u>	<u>RESULT</u>	<u>REPORTING LIMIT</u>	<u>UNITS</u>
Chloromethane	ND	2.0	ug/L
Bromomethane	ND	1.0	ug/L
Vinyl chloride	ND	1.0	ug/L
Chloroethane	ND	2.0	ug/L
Methylene chloride	ND	1.0	ug/L
Acetone	ND	10	ug/L
Carbon disulfide	ND	1.0	ug/L
1,1-Dichloroethene	ND	1.0	ug/L
1,1-Dichloroethane	ND	1.0	ug/L
Chloroform	ND	1.0	ug/L
1,2-Dichloroethane	ND	1.0	ug/L
2-Butanone	ND	10	ug/L
1,1,1-Trichloroethane	7.7	1.0	ug/L
Carbon tetrachloride	ND	1.0	ug/L
Bromodichloromethane	ND	1.0	ug/L
1,2-Dichloroproppane	ND	1.0	ug/L
cis-1,3-Dichloropropene	ND	1.0	ug/L
Trichloroethene	ND	1.0	ug/L
Dibromochloromethane	ND	1.0	ug/L
1,1,2-Trichloroethane	ND	1.0	ug/L
Benzene	ND	1.0	ug/L
trans-1,3-Dichloropropene	ND	1.0	ug/L
Bromoform	ND	1.0	ug/L
4-Methyl-2-pentanone	ND	5.0	ug/L
2-Hexanone	ND	10	ug/L
Tetrachloroethene	ND	1.0	ug/L
1,1,2,2-Tetrachloroethane	ND	1.0	ug/L
Toluene	ND	1.0	ug/L
Chlorobenzene	ND	1.0	ug/L
Ethylbenzene	ND	1.0	ug/L
Styrene	ND	1.0	ug/L
Xylenes (total)	ND	1.0	ug/L
cis-1,2-Dichloroethene	ND	0.50	ug/L
trans-1,2-Dichloroethene	ND	0.50	ug/L

<u>SURROGATE</u>	<u>PERCENT RECOVERY</u>	<u>RECOVERY LIMITS</u>
Dibromofluoromethane	104	(73 - 122)
1,2-Dichloroethane-d4	102	(61 - 128)
Toluene-d8	96	(76 - 110)
4-Bromofluorobenzene	94	(74 - 116)

CONESTOGA-ROVERS & ASSOC., LTD.

Client Sample ID: GW-3581-030102-BW-073

GC/MS Volatiles

Lot-Sample #....: A2C050137-007 Work Order #....: EVXAW1AA Matrix.....: WG
 Date Sampled....: 03/01/02 15:32 Date Received...: 03/05/02
 Prep Date.....: 03/09/02 Analysis Date...: 03/09/02
 Prep Batch #....: 2069100
 Dilution Factor: 1 Method.....: SW846 8260B

<u>PARAMETER</u>	<u>RESULT</u>	<u>REPORTING LIMIT</u>	<u>UNITS</u>
Chloromethane	ND	2.0	ug/L
Bromomethane	ND	1.0	ug/L
Vinyl chloride	ND	1.0	ug/L
Chloroethane	ND	2.0	ug/L
Methylene chloride	ND	1.0	ug/L
Acetone	ND	10	ug/L
Carbon disulfide	ND	1.0	ug/L
1,1-Dichloroethene	ND	1.0	ug/L
1,1-Dichloroethane	1.6	1.0	ug/L
Chloroform	ND	1.0	ug/L
1,2-Dichloroethane	ND	1.0	ug/L
2-Butanone	ND	10	ug/L
1,1,1-Trichloroethane	ND	1.0	ug/L
Carbon tetrachloride	ND	1.0	ug/L
Bromodichloromethane	ND	1.0	ug/L
1,2-Dichloropropane	ND	1.0	ug/L
cis-1,3-Dichloropropene	ND	1.0	ug/L
Trichloroethene	ND	1.0	ug/L
Dibromochloromethane	ND	1.0	ug/L
1,1,2-Trichloroethane	ND	1.0	ug/L
Benzene	ND	1.0	ug/L
trans-1,3-Dichloropropene	ND	1.0	ug/L
Bromoform	ND	1.0	ug/L
4-Methyl-2-pentanone	ND	5.0	ug/L
2-Hexanone	ND	10	ug/L
Tetrachloroethene	ND	1.0	ug/L
1,1,2,2-Tetrachloroethane	ND	1.0	ug/L
Toluene	ND	1.0	ug/L
Chlorobenzene	ND	1.0	ug/L
Ethylbenzene	ND	1.0	ug/L
Styrene	ND	1.0	ug/L
Xylenes (total)	ND	1.0	ug/L
cis-1,2-Dichloroethene	ND	0.50	ug/L
trans-1,2-Dichloroethene	ND	0.50	ug/L

<u>SURROGATE</u>	<u>PERCENT RECOVERY</u>	<u>RECOVERY LIMITS</u>
Dibromofluoromethane	102	(73 - 122)
1,2-Dichloroethane-d4	100	(61 - 128)
Toluene-d8	97	(76 - 110)
4-Bromofluorobenzene	92	(74 - 116)

CONESTOGA-ROVERS & ASSOC., LTD.

Client Sample ID: GW-3581-030102-BW-074

GC/MS Volatiles

Lot-Sample #....: A2C050137-008 Work Order #....: EVXAX1AA Matrix.....: WG
 Date Sampled....: 03/01/02 16:23 Date Received...: 03/05/02
 Prep Date.....: 03/08/02 Analysis Date...: 03/08/02
 Prep Batch #....: 2069100
 Dilution Factor: 1 Method.....: SW846 8260B

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Chloromethane	ND	2.0	ug/L
Bromomethane	ND	1.0	ug/L
Vinyl chloride	ND	1.0	ug/L
Chloroethane	ND	2.0	ug/L
Methylene chloride	ND	1.0	ug/L
Acetone	ND	10	ug/L
Carbon disulfide	ND	1.0	ug/L
1,1-Dichloroethene	ND	1.0	ug/L
1,1-Dichloroethane	ND	1.0	ug/L
Chloroform	ND	1.0	ug/L
1,2-Dichloroethane	ND	1.0	ug/L
2-Butanone	ND	10	ug/L
1,1,1-Trichloroethane	ND	1.0	ug/L
Carbon tetrachloride	ND	1.0	ug/L
Bromodichloromethane	ND	1.0	ug/L
1,2-Dichloroproppane	ND	1.0	ug/L
cis-1,3-Dichloropropene	ND	1.0	ug/L
Trichloroethene	ND	1.0	ug/L
Dibromochloromethane	ND	1.0	ug/L
1,1,2-Trichloroethane	ND	1.0	ug/L
Benzene	ND	1.0	ug/L
trans-1,3-Dichloropropene	ND	1.0	ug/L
Bromoform	ND	1.0	ug/L
4-Methyl-2-pentanone	ND	5.0	ug/L
2-Hexanone	ND	10	ug/L
Tetrachloroethene	ND	1.0	ug/L
1,1,2,2-Tetrachloroethane	ND	1.0	ug/L
Toluene	ND	1.0	ug/L
Chlorobenzene	ND	1.0	ug/L
Ethylbenzene	ND	1.0	ug/L
Styrene	ND	1.0	ug/L
Xylenes (total)	ND	1.0	ug/L
cis-1,2-Dichloroethene	ND	0.50	ug/L
trans-1,2-Dichloroethene	ND	0.50	ug/L

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	102	(73 - 122)
1,2-Dichloroethane-d4	96	(61 - 128)
Toluene-d8	96	(76 - 110)
4-Bromofluorobenzene	93	(74 - 116)

CONESTOGA-ROVERS & ASSOC., LTD.

Client Sample ID: GW-3581-030202-BW-075

GC/MS Volatiles

Lot-Sample #....: A2C050137-009 Work Order #....: EVXA01AA Matrix.....: WG
 Date Sampled....: 03/02/02 09:03 Date Received...: 03/05/02
 Prep Date.....: 03/09/02 Analysis Date...: 03/09/02
 Prep Batch #....: 2069100
 Dilution Factor: 1 Method.....: SW846 8260B

PARAMETER	RESULT	REPORTING	
		LIMIT	UNITS
Chloromethane	ND	2.0	ug/L
Bromomethane	ND	1.0	ug/L
Vinyl chloride	ND	1.0	ug/L
Chloroethane	ND	2.0	ug/L
Methylene chloride	ND	1.0	ug/L
Acetone	ND	10	ug/L
Carbon disulfide	ND	1.0	ug/L
1,1-Dichloroethene	ND	1.0	ug/L
1,1-Dichloroethane	ND	1.0	ug/L
Chloroform	ND	1.0	ug/L
1,2-Dichloroethane	ND	1.0	ug/L
2-Butanone	ND	10	ug/L
1,1,1-Trichloroethane	ND	1.0	ug/L
Carbon tetrachloride	ND	1.0	ug/L
Bromodichloromethane	ND	1.0	ug/L
1,2-Dichloropropane	ND	1.0	ug/L
cis-1,3-Dichloropropene	ND	1.0	ug/L
Trichloroethene	ND	1.0	ug/L
Dibromochloromethane	ND	1.0	ug/L
1,1,2-Trichloroethane	ND	1.0	ug/L
Benzene	ND	1.0	ug/L
trans-1,3-Dichloropropene	ND	1.0	ug/L
Bromoform	ND	1.0	ug/L
4-Methyl-2-pentanone	ND	5.0	ug/L
2-Hexanone	ND	10	ug/L
Tetrachloroethene	ND	1.0	ug/L
1,1,2,2-Tetrachloroethane	ND	1.0	ug/L
Toluene	ND	1.0	ug/L
Chlorobenzene	ND	1.0	ug/L
Ethylbenzene	ND	1.0	ug/L
Styrene	ND	1.0	ug/L
Xylenes (total)	ND	1.0	ug/L
cis-1,2-Dichloroethene	ND	0.50	ug/L
trans-1,2-Dichloroethene	ND	0.50	ug/L

SURROGATE	PERCENT RECOVERY	RECOVERY
		LIMITS
Dibromofluoromethane	102	(73 - 122)
1,2-Dichloroethane-d4	96	(61 - 128)
Toluene-d8	93	(76 - 110)
4-Bromofluorobenzene	90	(74 - 116)

CONESTOGA-ROVERS & ASSOC., LTD.

Client Sample ID: GW-3581-030202-BW-076

GC/MS Volatiles

Lot-Sample #....: A2C050137-010 Work Order #....: EVXA21AA Matrix.....: WG
 Date Sampled....: 03/02/02 09:58 Date Received...: 03/05/02
 Prep Date.....: 03/09/02 Analysis Date...: 03/09/02
 Prep Batch #....: 2069100
 Dilution Factor: 1 Method.....: SW846 8260B

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Chloromethane	ND	2.0	ug/L
Bromomethane	ND	1.0	ug/L
Vinyl chloride	ND	1.0	ug/L
Chloroethane	ND	2.0	ug/L
Methylene chloride	ND	1.0	ug/L
Acetone	ND	10	ug/L
Carbon disulfide	ND	1.0	ug/L
1,1-Dichloroethene	ND	1.0	ug/L
1,1-Dichloroethane	31	1.0	ug/L
Chloroform	ND	1.0	ug/L
1,2-Dichloroethane	ND	1.0	ug/L
2-Butanone	ND	10	ug/L
1,1,1-Trichloroethane	ND	1.0	ug/L
Carbon tetrachloride	ND	1.0	ug/L
Bromodichloromethane	ND	1.0	ug/L
1,2-Dichloropropane	ND	1.0	ug/L
Dibromochloromethane	ND	1.0	ug/L
1,1,2-Trichloroethane	ND	1.0	ug/L
Benzene	ND	1.0	ug/L
cis-1,3-Dichloropropene	ND	1.0	ug/L
Trichloroethene	ND	1.0	ug/L
trans-1,3-Dichloropropene	ND	1.0	ug/L
Bromoform	ND	1.0	ug/L
4-Methyl-2-pentanone	ND	5.0	ug/L
2-Hexanone	ND	10	ug/L
Tetrachloroethene	ND	1.0	ug/L
1,1,2,2-Tetrachloroethane	ND	1.0	ug/L
Toluene	ND	1.0	ug/L
Chlorobenzene	ND	1.0	ug/L
Ethylbenzene	ND	1.0	ug/L
Styrene	ND	1.0	ug/L
Xylenes (total)	ND	1.0	ug/L
cis-1,2-Dichloroethene	0.50	0.50	ug/L
trans-1,2-Dichloroethene	ND	0.50	ug/L

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	102	(73 - 122)
1,2-Dichloroethane-d4	96	(61 - 128)
Toluene-d8	95	(76 - 110)
4-Bromofluorobenzene	91	(74 - 116)

CONESTOGA-ROVERS & ASSOC., LTD.

Client Sample ID: TRIP BLANK

GC/MS Volatiles

Lot-Sample #....: A2C050137-011 Work Order #....: EVXA31AA Matrix.....: WQ
 Date Sampled...: 03/02/02 Date Received...: 03/05/02
 Prep Date.....: 03/09/02 Analysis Date...: 03/09/02
 Prep Batch #...: 2069100 Method.....: SW846 8260B
 Dilution Factor: 1

<u>PARAMETER</u>	<u>RESULT</u>	<u>REPORTING LIMIT</u>	<u>UNITS</u>
Chloromethane	ND	2.0	ug/L
Bromomethane	ND	1.0	ug/L
Vinyl chloride	ND	1.0	ug/L
Chloroethane	ND	2.0	ug/L
Methylene chloride	ND	1.0	ug/L
Acetone	ND	10	ug/L
Carbon disulfide	ND	1.0	ug/L
1,1-Dichloroethene	ND	1.0	ug/L
1,1-Dichloroethane	ND	1.0	ug/L
Chloroform	ND	1.0	ug/L
1,2-Dichloroethane	ND	1.0	ug/L
2-Butanone	ND	10	ug/L
1,1,1-Trichloroethane	ND	1.0	ug/L
Carbon tetrachloride	ND	1.0	ug/L
Bromodichloromethane	ND	1.0	ug/L
1,2-Dichloropropane	ND	1.0	ug/L
cis-1,3-Dichloropropene	ND	1.0	ug/L
Trichloroethene	ND	1.0	ug/L
Dibromochloromethane	ND	1.0	ug/L
1,1,2-Trichloroethane	ND	1.0	ug/L
Benzene	ND	1.0	ug/L
trans-1,3-Dichloropropene	ND	1.0	ug/L
Bromoform	ND	1.0	ug/L
4-Methyl-2-pentanone	ND	5.0	ug/L
2-Hexanone	ND	10	ug/L
Tetrachloroethene	ND	1.0	ug/L
1,1,2,2-Tetrachloroethane	ND	1.0	ug/L
Toluene	ND	1.0	ug/L
Chlorobenzene	ND	1.0	ug/L
Ethylbenzene	ND	1.0	ug/L
Styrene	ND	1.0	ug/L
Xylenes (total)	ND	1.0	ug/L
cis-1,2-Dichloroethene	ND	0.50	ug/L
trans-1,2-Dichloroethene	ND	0.50	ug/L

<u>SURROGATE</u>	<u>PERCENT RECOVERY</u>	<u>RECOVERY LIMITS</u>
Dibromofluoromethane	102	(73 - 122)
1,2-Dichloroethane-d4	98	(61 - 128)
Toluene-d8	97	(76 - 110)
4-Bromofluorobenzene	94	(74 - 116)

QUALITY CONTROL SECTION

METHOD BLANK REPORT

GC/MS Volatiles

Client Lot #....: A2C050137
MB Lot-Sample #: A2C100000-100

Work Order #....: EV7G71AA

Matrix.....: WATER

Analysis Date...: 03/08/02
Dilution Factor: 1

Prep Date.....: 03/08/02
Prep Batch #....: 2069100

PARAMETER	RESULT	REPORTING		
		LIMIT	UNITS	METHOD
Acetone	ND	10	ug/L	SW846 8260B
Benzene	ND	1.0	ug/L	SW846 8260B
Bromodichloromethane	ND	1.0	ug/L	SW846 8260B
Bromoform	ND	1.0	ug/L	SW846 8260B
Bromomethane	ND	1.0	ug/L	SW846 8260B
2-Butanone	ND	10	ug/L	SW846 8260B
Carbon disulfide	ND	1.0	ug/L	SW846 8260B
Carbon tetrachloride	ND	1.0	ug/L	SW846 8260B
Chlorobenzene	ND	1.0	ug/L	SW846 8260B
Dibromochloromethane	ND	1.0	ug/L	SW846 8260B
Chloroethane	ND	2.0	ug/L	SW846 8260B
Chloroform	ND	1.0	ug/L	SW846 8260B
Chloromethane	ND	2.0	ug/L	SW846 8260B
1,1-Dichloroethane	ND	1.0	ug/L	SW846 8260B
1,2-Dichloroethane	ND	1.0	ug/L	SW846 8260B
1,1-Dichloroethene	ND	1.0	ug/L	SW846 8260B
cis-1,2-Dichloroethene	ND	0.50	ug/L	SW846 8260B
trans-1,2-Dichloroethene	ND	0.50	ug/L	SW846 8260B
1,2-Dichloropropane	ND	1.0	ug/L	SW846 8260B
Ethylbenzene	ND	1.0	ug/L	SW846 8260B
2-Hexanone	ND	10	ug/L	SW846 8260B
Methylene chloride	ND	1.0	ug/L	SW846 8260B
4-Methyl-2-pentanone	ND	5.0	ug/L	SW846 8260B
Styrene	ND	1.0	ug/L	SW846 8260B
1,1,2,2-Tetrachloroethane	ND	1.0	ug/L	SW846 8260B
Tetrachloroethene	ND	1.0	ug/L	SW846 8260B
Toluene	ND	1.0	ug/L	SW846 8260B
1,1,1-Trichloroethane	ND	1.0	ug/L	SW846 8260B
1,1,2-Trichloroethane	ND	1.0	ug/L	SW846 8260B
Trichloroethene	ND	1.0	ug/L	SW846 8260B
Vinyl chloride	ND	1.0	ug/L	SW846 8260B
Xylenes (total)	ND	1.0	ug/L	SW846 8260B
cis-1,3-Dichloropropene	ND	1.0	ug/L	SW846 8260B
trans-1,3-Dichloropropene	ND	1.0	ug/L	SW846 8260B

SURROGATE	PERCENT	RECOVERY
		LIMITS
Dibromofluoromethane	105	(73 - 122)
1,2-Dichloroethane-d4	97	(61 - 128)
Toluene-d8	96	(76 - 110)
4-Bromofluorobenzene	94	(74 - 116)

(Continued on next page)

METHOD BLANK REPORT

GC/MS Volatiles

Client Lot #....: A2C050137

Work Order #....: EV7G71AA

Matrix.....: WATER

NOTE (S) :

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

GC/MS Volatiles

<u>PARAMETER</u>	<u>PERCENT RECOVERY</u>	<u>RECOVERY LIMITS</u>	<u>RPD</u>	<u>RPD LIMITS</u>	<u>METHOD</u>
1,1-Dichloroethene	98	(63 - 130)			SW846 8260B
	100	(63 - 130)	1.8	(0-20)	SW846 8260B
Trichloroethene	103	(75 - 122)			SW846 8260B
	103	(75 - 122)	0.010	(0-20)	SW846 8260B
Benzene	98	(80 - 116)			SW846 8260B
	99	(80 - 116)	1.1	(0-20)	SW846 8260B
Toluene	95	(74 - 119)			SW846 8260B
	100	(74 - 119)	5.6	(0-20)	SW846 8260B
Chlorobenzene	96	(76 - 117)			SW846 8260B
	98	(76 - 117)	2.2	(0-20)	SW846 8260B

<u>SURROGATE</u>	<u>PERCENT</u>	<u>RECOVERY</u>
	<u>RECOVERY</u>	<u>LIMITS</u>
Dibromofluoromethane	99	(73 - 122)
	98	(73 - 122)
1,2-Dichloroethane-d4	96	(61 - 128)
	98	(61 - 128)
Toluene-d8	96	(76 - 110)
	100	(76 - 110)
4-Bromofluorobenzene	95	(74 - 116)
	99	(74 - 116)

NOTE (S) :

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

MATRIX SPIKE SAMPLE EVALUATION REPORT

GC/MS Volatiles

Client Lot #....: A2C050137 Work Order #....: EVXAX1AC-MS Matrix.....: WG
 MS Lot-Sample #: A2C050137-008 EVXAX1AD-MSD
 Date Sampled...: 03/01/02 16:23 Date Received...: 03/05/02
 Prep Date.....: 03/08/02 Analysis Date...: 03/08/02
 Prep Batch #....: 2069100
 Dilution Factor: 1

<u>PARAMETER</u>	<u>PERCENT</u>	<u>RECOVERY</u>	<u>RPD</u>	<u>LIMITS</u>	<u>METHOD</u>
	<u>RECOVERY</u>	<u>LIMITS</u>			
1,1-Dichloroethene	102	(62 - 130)			SW846 8260B
	96	(62 - 130)	5.9	(0-20)	SW846 8260B
Trichloroethene	104	(62 - 130)			SW846 8260B
	96	(62 - 130)	7.3	(0-20)	SW846 8260B
Benzene	97	(78 - 118)			SW846 8260B
	93	(78 - 118)	4.1	(0-20)	SW846 8260B
Toluene	96	(70 - 119)			SW846 8260B
	92	(70 - 119)	4.5	(0-20)	SW846 8260B
Chlorobenzene	96	(76 - 117)			SW846 8260B
	90	(76 - 117)	6.1	(0-20)	SW846 8260B

<u>SURROGATE</u>	<u>PERCENT</u>	<u>RECOVERY</u>
	<u>RECOVERY</u>	<u>LIMITS</u>
Dibromofluoromethane	100	(73 - 122)
	95	(73 - 122)
1,2-Dichloroethane-d4	96	(61 - 128)
	98	(61 - 128)
Toluene-d8	95	(76 - 110)
	94	(76 - 110)
4-Bromofluorobenzene	94	(74 - 116)
	90	(74 - 116)

NOTE (S) :

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

CRA

CONESTOGA-ROVERS & ASSOCIATES, INC.
14496 Sheldon Road, Suite 200
Plymouth, MI 48170 • (734) 453-5123

SHIPPED TO (Laboratory Name):

STL

CHAIN OF CUSTODY RECORD

REFERENCE NUMBER:

3581

PROJECT NAME:

Spiegelberg

SAMPLER'S

Bart Will

PRINTED

NAME: *Bart Williams*

PARAMETERS

TV₁
VOLs

SEQ. No.	DATE	TIME		SAMPLE TYPE	No. OF CONTAINERS	REMARKS
1	3/1/02	0941	GW-3581-030102-BW - 067	H ₂ O	3 Y	
2		1041		068	1 3 Y	
3		1201		069	3 Y	
4		1352		070	3 Y	
5		1400		071	3 Y	
6		1438		072	3 Y	
7		1532		073	3 Y	
8		1623		074	6 Y	ADD WD MSMSP
9	3/2/02	0903	GW-3581-030202-BW - 075		3 Y	
10		0958	+	076	3 Y	
			T.R.P. Blank		1 X	CRA contact Paul W

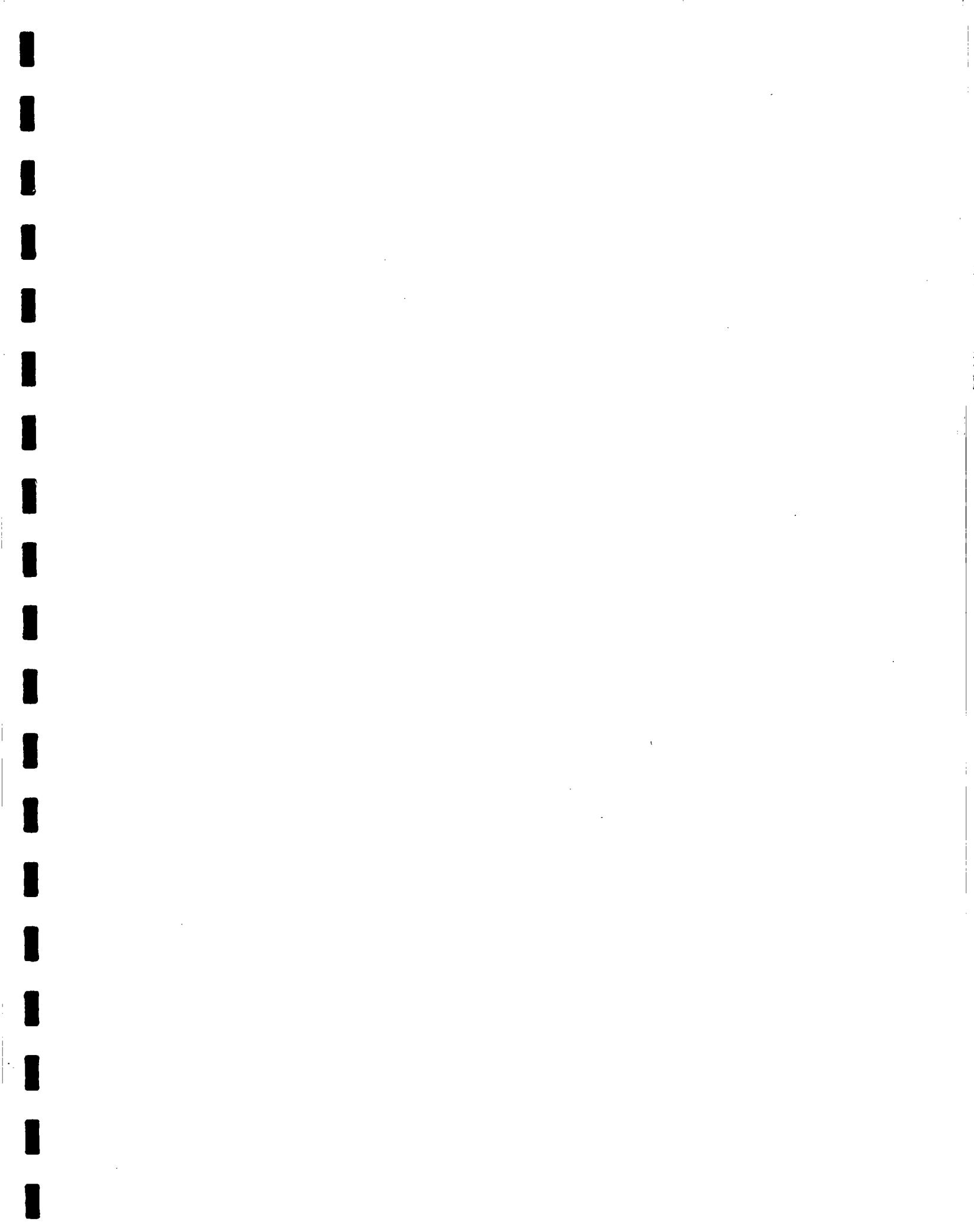
TOTAL NUMBER OF CONTAINERS

RELINQUISHED BY: 1. <i>SWO</i>	DATE: 3/4/02 TIME: 2000	RECEIVED BY: 1. _____	DATE: TIME:
RELINQUISHED BY: 2. _____	DATE: TIME:	RECEIVED BY: 2. _____	DATE: TIME:
RELINQUISHED BY: 3. _____	DATE: TIME:	RECEIVED BY: 1. _____	DATE: TIME:

METHOD OF SHIPMENT: *FED-EX*

AIR BILL No.

White Yellow	-Fully Executed Copy -Receiving Laboratory Copy	Pink Goldenrod	-Shipper Copy -Sampler Copy	SAMPLE TEAM: _____ _____ _____	RECEIVED FOR LABORATORY BY: <i>Hilie Sanders</i> DATE: 3-5-02 TIME: 1000
21640					



APPENDIX C

DATA VALIDATION MEMORANDUM



**CONESTOGA-ROVERS
& ASSOCIATES**

651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2
Telephone: (519) 884-0510 Fax: (519) 884-0525
www.CRAworld.com

MEMORANDUM

TO: Angela Mason

REF. NO.: 3581

FROM: Stephanie Tomka/cm/75 *ST*

DATE: April 3, 2002

RE: **Data Quality Assessment and Validation for the
Groundwater Samples Collected at the
Spiegelberg Site in Livingston County, Michigan**

The following details a data quality assessment and validation for ten groundwater samples and one trip blank sample collected March 1 and 2, 2002 at the Spiegelberg Site in Livingston County, Michigan. The samples collected are listed in Table 1. All samples collected were sent to Severn Trent Laboratories, Inc. of North Canton, Ohio and analyzed for the target compound list (TCL) volatile organic compounds (VOCs), as listed in Table 2. The method used is also presented in Table 2. The quality assurance criteria used to assess the data were established by the methods of analysis¹.

Holding Time Periods

The holding time criterion is presented in Table 2. All analyses were prepared and analyzed within holding time criteria with no exceptions. As a result, no qualifications were granted on this basis.

Method Blank Samples

Contamination of samples contributed by laboratory conditions or procedures was monitored by the data from concurrent preparation and analysis of method blank samples. All method blank samples analyzed were free of target compounds with no exceptions. Therefore, no data qualifications were required.

Surrogate Compound Percent Recoveries

Individual sample performance for organic analyses was monitored by assessing surrogate compound percent recovery data. Surrogate compounds were analyzed with all volatile organic compound (VOC) analyses. The samples for VOC analysis were spiked with the surrogate compounds dibromofluoromethane, 1,2-dichloroethane-d₄, toluene-d₈ and 4-bromofluorobenzene.

All surrogate recoveries fell within laboratory-established control limits, with no exceptions. Qualifications were deemed unnecessary.

¹ Application of quality assurance criteria was consistent with the relevant criteria in " USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review ", EPA-540/R-94/012, February 1994.

Laboratory Control Samples

Laboratory control sample (LCS) analysis serves to monitor the accuracy of the laboratory preparation and analysis methods.

All LCS recoveries for target parameters fell within acceptance criteria with no exceptions. Therefore, qualifications were not required.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Samples- Organic Analyses

MS/MSD analyses provide insight into sample matrix effects on the sample analyses. The precision of the method is reflected by the reproducibility of the MS and MSD recoveries. A Relative Percent Difference (RPD) was calculated for all positive MS/MSD results.

Within the MS/MSD sample analyses for GW-3581-030102-BW-074, recoveries fell within control limits, with no exceptions. Qualifications were deemed unnecessary.

Field Quality Assurance/Quality Control (QA/QC)

To monitor potential cross-contamination of VOCs during sample transportation and storage, one trip blank sample was submitted to the laboratory for VOC analysis. Target analytes were not detected in the trip blank sample and as a result, qualifications were not required.

Field duplicate samples are used as an indication of field and analytical reproducibility. Field duplicate results are compared and assessed based on the RPD calculated for each pair of duplicate results. The RPD must not exceed 30% for water matrix samples. One duplicate sample set was collected and analyzed with this sampling event; GW-3581-030102-BW-070/071. All calculated RPDs fell with acceptance criteria. Therefore, no data qualifications were required.

Overall Assessment

The data provided by Severn Trent Laboratories demonstrate acceptable accuracy and precision and may be used without qualifications.

TABLE 1

SUMMARY OF INVESTIGATIVE SAMPLES
SPIEGELBERG SITE
LIVINGSTON COUNTY, MICHIGAN
MARCH, 2002

Sample Identification

Quanterra Analytical Report A2C050137

GW-3581-030102-BW-067
GW-3581-030102-BW-068
GW-3581-030102-BW-069
GW-3581-030102-BW-070
GW-3581-030102-BW-071
GW-3581-030102-BW-072
GW-3581-030102-BW-073
GW-3581-030102-BW-074
GW-3581-030202-BW-075
GW-3581-030202-BW-076

TABLE 2

**SUMMARY OF ANALYTICAL METHODS
AND SAMPLE HOLDING TIMES
SPIEGELBERG SITE
LIVINGSTON COUNTY, MICHIGAN
MARCH, 2002**

<i>Analysis</i>	<i>Analytical Method Used</i>	<i>Holding Time (days)</i>	<i>Water Matrix</i>
TCL VOCs	SW-846 8260B	14	

Notes:

VOC - Volatile Organic Compounds

TCL - Target Compound List

SW-846 - "Test Methods for Evaluating Solid Waste, Physical/ Chemical Methods",
EPA SW-846, November 1986 and promulgated updates.